Tata McGraw Hill
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STUDY PACKAGE IN

Mental Ability

National Talent Search Examination
Medical College Entrance Examination

Tata McGraw-Hill NTSE Series

Study Package in

MENTAL ABILITY

For Class IX-X and
National Talent Search Examination

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Tata McGraw-Hill Publishing Company Limited
NEW DELHI

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McGraw-Hill Offices

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Ninth Reprint 1992

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This edition can be exported from India only by the publishers,
Tata McGraw-Hill Publishing Company Limited

Published by Tata McGraw-Hill Publishing Company Limited,
4/12, Asaf Ali Road, New Delhi 110 002,
printed at Ram Printograph (India), New Delhi 110 020

Preface

This book has been designed to meet the requirements of students who are taking the National Talent Search Examination. Competitive examinations have become an essential feature for gaining entry to almost every field of endeavour. Mental ability and aptitude tests have become the most important yardsticks for selection of candidates in all competitive examinations.

This book covers all types of medium and advanced level problems. It is based on the experience gained during many years of teaching a wide variety of students. We have aimed at presenting different concepts in a logical and systematic way and tried to reveal the unity of the subject. Chapters have been expanded in accordance with the latest trend in examinations. This will help students channelize their efforts towards an analytical and scientific approach.

We acknowledge our gratitude to all our friends for their generous assistance and kind suggestions.

S Z HAQUE
S MALHOTRA

Contents

Preface		iii
Introduction		1
Unit		
One	Number Series	1
Two	Letter Series	5
Three	Sequence of Letters	7
Four	Problems on Jumbled Letters	9
Five	Mathematical Aptitude I	10
Six	Mathematical Aptitude II	12
Seven	Numbers Round the Circle	14
Eight	Numbers in Squares or Cells	16
Nine	Coding-Decoding I	19
Ten	Coding-Decoding II	21
Eleven	Letter Number Series	23
Twelve	Problems on Venn Diagrams	25
Thirteen	Logical Diagrams	27
Fourteen	Graphic Interpretations	29
Fifteen	Analogy Test	34
Sixteen	Sets of Numbers	35
Seventeen	Spatial Ability	37
Eighteen	Geometrical Diagrams	39
Nineteen	Identification of Geometrical Patterns	41
Twenty	Problems on Building Designs	42
Twentyone	Point Location Test	45
Answers		47

Introduction

In the world of human affairs we come across various kinds of people. They differ from each other in many ways. If you want to know something about a man you study his personality the integration of his various characteristics, his mode of behaviour, interest, attitude, design of thinking, aptitude, capacity and ability to think and to do work, i.e. the whole person as others know him. Some of these characteristics can be measured and calibrated by mental ability tests which involve certain levels of intelligence, aptitude, reasoning and common sense.

Mental ability or reasoning faculty is the ability to distinguish between right and wrong, to judge the minutest difference and to adapt to the everchanging environment, the wit to master the situation, the capacity to learn and to put past experience to the most advantageous use in future and the ability to distinguish between important, less important and more important.

All traits of the mind put together may be called intelligence, a complex term which may be defined as the ability of a person to adapt to a novel situation. In man it involves an ability to utilize abstract concepts and to learn and grasp novel relationships.

Aptitude is one of the most important traits of the human mind. It is the capacity to learn readily and to achieve high-level skills in specific areas such as mathematics, music or mechanics. It refers to the potential rather than the actual accomplishment.

UNIT ONE

Number Series

BRIEF REVIEW OF CONCEPTS

This chapter deals with number series and operation on numbers. Each number in the given series follows its predecessor in a certain way, i.e. according to some definite scheme. Candidates are required to find out the way in which the series is formed and hence work out the missing number to complete the series. The series may be classified as follows

1. Difference series
2. Product series
3. Square series
4. Mixed series

• The *difference series* can be further classified into two

(a) Number series with constant difference
(b) Number series with increasing or decreasing difference

In the number series with constant difference there is always a constant difference between two consecutive numbers, e.g. the series

1, 4, 7, 10, 13, 16, 19, ...

Here each number increases by 3, or the

difference between any two consecutive numbers is 3, i.e. 4—1=3, 7—4=3, 10—7=3, and so on. Hence, the missing number which follows 19 should be 22, because 22—19=3. Another example with numbers in decreasing order is,

36, 32, 28, 24, ...

Here, the difference between any two consecutive numbers is 4, i.e. each number is 4 less than the last, i.e. 36—32=4, 32—28=4, 28—24=4. Hence, the missing number which follows 24 should be 20 because 24—20=4. In the number series with increasing or decreasing difference, the difference between two consecutive numbers increases or decreases, e.g.

2, 3, 5, 8, 12, 17, 23, ...

We find that the difference between two consecutive numbers is in increasing order, i.e. 3—2=1, 5—3=2, 8—5=3, 12—8=4, 17—12=5, and so on. Thus, the difference is in the order 1, 2, 3, 4, 5, etc. Hence, the missing number which follows 23 should be 30 because the difference between 23 and 17 is 6, so the next difference should be 7 and 30—23=7.

Another similar example is

35, 30, 24, 17, ...

Here again we find that the differences between consecutive numbers is in increasing order. The difference between 35 and 30 is 5, 30 and 24 is 6, 24 and 17 is 7, and so on. Hence, the missing number which follows 17 should be 9 because the difference has to be 8 in this case; the differences 5, 6, 7, 8, are in increasing order.

We can also have a number series with differences in decreasing order. For example,

10, 15, 19, 22, 24, ...

Differences between consecutive numbers are not the same as,

15—10=5
19—15=4
22—19=3
24—22=2, and so on.

The difference between numbers is in decreasing order. Hence the missing number which follows 24 is 25.

● A *product series* is usually a number series, the numbers of which are multiples of a constant number or the product of numbers in increasing or decreasing order. For example,

2, 4, 8, 16, 32, 64, ...

Here, each number in the series is multiplied by 2 to get the next number, like 2×2=4, 4×2=8, 8×2=16 and so on. Hence, the number which follows 64 should be 64×2=128. Now let us discuss the series in which the numbers are multiples of increasing or decreasing numbers, e.g.

4, 20, 80, 240, ...

In this case, 4×5=20, 20×4=80, 80×3=240. Here the number is multiplied by 5, 4, 3, 2, etc. to get the next number.

Similarly, we can have a series in which the numbers are products of numbers of increasing order, e.g.

2, 4, 12, 48, ...

Here, the first number is multiplied by 2 to get the second number, the second by 3 to get the third, the third by 4 to get the fourth, and so on. The missing number which follows 48 is, therefore, 240.

Division may be treated as a form of multiplication. Hence, a division series may be formed in the same fashion, e.g.

64, 32, 16, 8, ...

Here, each number is divided by a constant number 2 to obtain the next number. We can therefore, call it a simple multiple of $\frac{1}{2}$, such as

$64\times\frac{1}{2}=32$, $32\times\frac{1}{2}=16$ $16\times\frac{1}{2}=8$

and so on. Hence, the missing number which follows 8 is 4.

● In a *square series* the numbers may have the following possibilities.

1. Each term may be the square of natural number, such as

1, 4, 9, 16, 25, ...

The missing number which follows 25 is 36 because 1, 4, 9, 16, 25 are the squares of 1, 2, 3, 4 and 5, respectively.

2. Terms may be the squares of
   (a) odd numbers like 1, 9, 25, 49, 81, etc.
   (b) even numbers like 4, 16, 36, 64, etc.

3. Each number may be the square root of its predecessor, e.g.

81, 9, 64, 8, 49, 7, 36, 6, 25, ...

Here, 81 is the square of 9, or 9 is the square-root of 81. Similarly 64 is the square of 8, 49 is the square of 7, and so on. Hence, the missing number which follows 25 is 5.

● A number series which has more than one operation may be a mixture of any two series described above. A *mixed series* may have the following possible forms.

1. It may have more than one operation, e.g.

2, 6, 10, 3, 9, 13, 4, 12, ...

Here, the first term 2 is multiplied by 3 to get the second term, and 4 is added to get the third, i.e.

$2 \times 3 = 6$, and $6 + 4 = 10$
$3 \times 3 = 9$ and $9 + 4 = 13$
$4 \times 3 = 12$ and $12 + 4 = 16$

and so on.

Hence, the missing number in the above series is 16.

2. A mixed series may be a mixture of two series, e.g.

8, 12, 9, 13, 10, 14, ...

Here, 8, 9, 10, ... form one series while 12, 13, 14, ... form another. These have been placed alternately. Therefore, the missing number which follows is 11.

3. A mixed series may be formed by the combination of two different series, putting their numbers alternately, e.g.

0, 7, 2, 17, 6, 31, 12, 49, 20, ...

Here, the series (0, 2, 6, 12, 20, ...) is combined with an another series, (7, 17, 31, 49, ...). The first series has the difference in increasing order 2, 4, 6, 8, 10, and so on. The second series also has the difference in increasing order 10, 14, 18, ... We now have to find which series the number following 20 belongs to. Since 20 belongs to the first series, a number from the second series will follow, i.e. 71.

4. A mixed series may be formed by the combination of two square series or square-cube series, e.g.

1, 1, 2, 4, 3, 9, 4, 16, ...

Here, one series is (1, 2, 3, 4, ...) and the other is formed by squaring each number of the first series, i.e. (1, 4, 9, 16, ...). These two series are placed alternately in the mixed series, hence it takes the form

$1, 1^2, 2, 2^2, 3, 3^2, 4, 4^2, 5, 5^2, \ldots$

i.e. 1, 1, 2, 4, 3, 9, 4, 16, 5, 25, ...

Hence, the term which follows 16 in the given mixed series is 5. Another similar example is,

1, 1, 4, 8, 9, 27, ...

This is a combination of the square and cube series of natural number, which can be written

$1^2, 1^3, 2^2, 2^3, 3^2, 3^3, 4^2, 4^3, 5^2, 5^3, \ldots$

OBJECTIVE EVALUATION

Find the missing term in the following series.

1. 2, 3, 5, 7, 11, ..., 17.
   (a) 12 (b) 13 (c) 14
   (d) 15 (e) 16

2. 5, 11, 17, ... 31, 41.
   (a) 19 (b) 21 (c) 23
   (d) 25 (e) 27

3. 7, 13, 21, 29, 43, 57.
   (a) 27 (b) 29 (c) 31
   (d) 35 (e) 41

4. 3, 15, 35, ... 99, 143.
   (a) 63 (b) 69 (c) 77
   (d) 81 (e) 85

5. 1, 1, 2, 4, 3, 9, 4 ...
   (a) 9 (b) 10 (c) 11
   (d) 5, (e) 13

6. 0, 7, 26, ..., 124, 215.
   (a) 37 (b) 51 (c) 63
   (d) 88 (e) 25

7. 1, 1, 8, ..., 27, 9, 64.
   (a) 4 (b) 6 (c) 9
   (d) 16 (e) 25

8. 2, 20, ..., 110, 182.
   (a) 56 (b) 72 (c) 90
   (d) 96 (e) 100

9. 3, 8, 35, 48, ..., 120.
   (a) 64 (b) 72 (c) 80
   (d) 96 (e) 99

10. 3, 6, 24, 30, 63, 72, ..., 132.
    (a) 42 (b) 58 (c) 90
    (d) 110 (e) 120

11. 1, 3, 6, 10, 15, ... 28, 36.
    (a) 20 (b) 21 (c) 23
    (d) 24 (e) 25

12. 1, 5, 9, ..., 25, 37, 49, 65.
    (a) 11 (b) 13 (c) 15
    (d) 17 (e) 18

13. 0, 2, 6, 12, 20, 30, 42, ...
    (a) 50 (b) 52 (c) 54
    (d) 55 (e) 56

14. 7, 17, 31, 49, ..., 97, 127.
    (a) 59 (b) 61 (c) 71
    (d) 87 (e) 91

15. 0, 3, 8, 15, 24, 35, 48 ...
    (a) 51 (b) 55 (c) 56
    (d) 63 (e) 65

16. 0, 2, 8, 14, 24, 34, ..., 62.
    (a) 40 (b) 42 (c) 48
    (d) 52 (e) 56

17. 12, 12, 26, 25, 74, ..., 150, 103.
    (a) 35 (b) 39 (c) 51
    (d) 56 (e) 63

18. 2, 12, 30, ..., 90, 132.
(a) 48 (b) 56 (c) 63
(d) 72 (e) 81

19. 2, 9, 28, ..., 126, 217.
(a) 36 (b) 42 (c) 56
(d) 65 (e) 95

20. 41, 31, ..., 17, 11, 5.
(a) 19 (b) 21 (c) 23
(d) 27 (e) 29

21. 2, 6, 12, 20, 42, ...
(a) 56 (b) 64 (c) 72
(d) 12 (e) 100

22. 24, 49, 105, 398, 797.
(a) 51 (b) 63 (c) 97
(d) 89 (e) 95

23. 4, 9, 20, 37, 60, ...
(a) 88 (b) 89 (c) 90
(d) 89 (e) 91

24. 37, 61, ..., 127, 169, 217.
(a) 67 (b) 69 (c) 71
(d) 89 (e) 91

25. 29, 36, 44, 53, ...
(a) 55 (b) 63 (c) 65
(d) 69 (e) 71

26. 86, 79, 100, 97, 90 ...
(a) 97 (b) 99 (c) 103
(d) 111 (e) 117

27. 67, 84, 95, ..., 133, 144.
(a) 116 (b) 129 (c) 108
(d) 111 (e) 121

28. 7, 10, 9, 12, 11, ...
(a) 17 (b) 15 (c) 14
(d) 16

29. 8, 10, 14, 18, ..., 34, 50, 66.
(a) 28 (b) 27 (c) 26
(d) 25

30. 2, 7, 24, 77, ...
(a) 200 (b) 208 (c) 188
(d) 238

31. 6, 9, 18, 21, 42, 45, ...
(a) 93 (b) 90 (c) 98
(d) 96

32. 3, 7, 16, 35, ...
(a) 44 (b) 54 (c) 64
(d) 74

33. 36, 30, 24, 18, ...
(a) 12 (b) 10 (c) 8
(d) 6

34. 4, 9, 17, 35, ..., 139.
(a) 89 (b) 79 (c) 69
(d) 59

35. 2, 5, 9, 19, 37, ...
(a) 65 (b) 74 (c) 76
(d) 75

36. 7, 15, 32, ..., 138, 281.
(a) 57 (b) 67 (c) 77
(d) 87

37. 17, 19, ..., 20, 15.
(a) 18 (b) 20 (c) 16
(d) 14

38. 4, 6, 9, 14, ...
(a) 27 (b) 23 (c) 19
(d) 17

39. 8, 12, 10, 16, 12, ...
(a) 20 (b) 18 (c) 16
(d) 14

40. 6, 9, 18, 21, 42, 45 ...
(a) 93 (b) 90 (c) 98
(d) 96

41. 10, 2, 20, 3, 30, 4, ...

42. 25, 24, 22, 19, 15, 10, ...

43. 5, 2, 6, 2, 7, 2, ...

44. 24, 6, 48, 12, 96, 24, ...

45. 21, 23, 23, 25, 25, 25, ...

46. 3, 10, 18, 27, 37, 48, ...

47. 5, 10, 7, 12, 9, 14, ...

48. 1, 3, 9, 27, 81, 243, ...

49. 10, 7, 6, 8, 5, 4, ...

50. 4, 8, 16, 32, 64, 128 ...

UNIT TWO

Letter Series

BRIEF REVIEW OF CONCEPTS

The questions in this chapter are based on letter series. In each series some letters are missing. The letters are arranged in sequences which may be formed in the following ways.

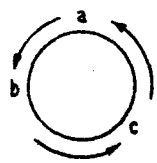
● The letters *a*, *b*, *c* may be arranged in *cyclic order* to form a group and then repeated to form a series. Some letters of this series are missing. You have to find the sequence of the series and choose the correct alternative from the choice given below. Let us take a series, e.g.

a—c—b—ab—a—ca—c.

(a) *abaccb* (b) *accbab* (c) *aabbcc*
(d) *baccbb* (e) *ababac*

Now we have to choose one of the alternatives from the given choice such that if the letters are placed in the blanks of the series, in order, we must get a series the letters of which are in a particular sequence. Therefore, if we put the letters of the fourth choice, i.e. *b a c c b b*, then we get the series,

a b c a b c a b c a b c a b c.



Here *a b c* is repeated many times to form a series. Hence, the answer is (d).

● A sequence may be formed by repeating some letters in a group. Consider

—b—a—a—ba—b—.

(a) *babaab* (b) *aabaab* (c) *bababb*
(d) *abbaab* (e) *aabaaa*

The answer is obviously (e). When the letters of this group are placed, respectively, in each gap, we get a series in which the letters *aba* are repeated *—aba aba aba aba aba aba*

● A sequence of letters may be formed by repeating the same group of letters, skipping one and repeating another. Consider the following example.

ab—c—c—a—ab—a—cc.

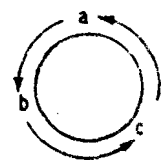
(a) *bbccab* (b) *aabcba* (c) *cbacbb*
(d) *bacbbc* (e) *aacbcc*

If we put the letters of choice (c) in the blanks of the above series, the series obtained is,

abccbcaacabbabcc.

Here in the group of letters *abcc*, *c* is repeated. Next, *a* is dropped from *abc*. We start from *b* and the last letter in the cycle is repeated. The group of letters so formed are

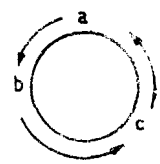
abcc
bcaa
cabb



Putting them together we get the above series.

● A sequence of letters in series may be formed by simply repeating the same group of letters, skipping one letter in turn, in cycle order.

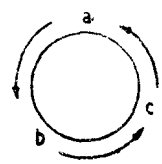
—b—bca—a—ab—



(a) *abbca* (b) *babac* (c) *accbc*
(d) *abbac* (e) *cabba*

If the letters of group (c) are placed in the blanks, respectively, we get,

a b c b c a c a b a b c.



In cyclic order from *a* we have *abc* from *b* we get *bca*, and from *c*, *cab*. Putting them together ,we get the above series.

● A series of letters may be formed on the basis of some rhythm, e.g.

a—ba—b—b—a—b.

(a) *aabba* (b) *abaab* (c) *abbab*
(d) *bbabb* (e) *aabaa*

If we put the letters of group 4 in the blanks, we get the series

abbabbabbabb

which produces a sort of rhythm.

OBJECTIVE EVALUATION

The following questions are based on the letter series. In each series some letters are missing. The letters in the series are arranged in a proper sequence. Find the sequence and encircle the correct group of letters given in the choice.

1. *—ab—b—aba——ab.*
(a) *abbaa* (b) *bbaab* (c) *abaab*
(d) *aabaa* (e) *aaaba*

2. *b—ab—a——ba—b.*
(a) *bbbaa* (b) *ababb* (c) *baabb*
(d) *aabaa* (e) *ababa*

3. *—bb—ba—ba—a—b*
(a) *babaa* (b) *abbaa* (c) *aabab*
(d) *ababa* (e) *aabbb*

4. *—c—ca—ab—bc—.*
(a) *abcac* (b) *babca* (c) *ccabb*
(d) *bcabb* (e) *acbba*

5. *—ab—b—bc—ca—.*
(a) *cacab* (b) *abcca* (c) *abacb*
(d) *accbb* (e) *abcba*

6. *—b—ab—cb—a—c.*
(a) *accba* (b) *abacb* (c) *cacab*
(d) *babcc* (e) *acabc*

7. *—ab—a—aa—ba—aa.*
(a) *ababa* (b) *bbaba* (c) *aabbb*
(d) *aabab* (e) *babaa*

8. *—ca—c—bc—b—a.*
(a) *abcba* (b) *bbaac* (c) *ccbab*
(d) *aaccc* (e) *cbaca*

9. *ab—cb—c—c——b.*
(a) *bcaaa* (b) *aabbc* (c) *abcab*
(d) *acbca* (e) *bcabc*

10. *ba—b—a——ba—b.*
(a) *ababa* (b) *baabb* (c) *abaab*
(d) *bbaab* (e) *aabaa*

11. *ab—ca—bb—ab———c.*
(a) *abbcac* (b) *cbacba* (c) *cbbcab*
(d) *bbcbbb* (e) *abccba*

12. *a—b——ab—aa—c.*
(a) *abbca* (b) *abbbc* (c) *acacb*
(d) *cacba* (e) *aabca*

13. *a——ba—b—aa—b.*
(a) *aabab* (b) *ababb* (c) *bbaba*
(d) *abbab* (e) *baaba*

14. *a—cac—a——a—c.*
(a) *caaca* (b) *accac* (c) *aaaaa*
(d) *ccccc* (e) *aacac*

15. *—bcb—c——cb—c.*
(a) *bbbbb* (b) *bccbc* (c) *ccbcb*
(d) *cccbc* (e) *bccbb*

16. *—b—cba—ba—b—.*
(a) *aabba* (b) *aabca* (c) *acbab*
(d) *cacca* (e) *aacba*

17. *ab——ca—c—a—c—*
(a) *cbcbc* (b) *bbcab* (c) *abcba*
(d) *acbba* (e) *bcabb*

18. *ab—baa——b—b—bb.*
(a) *babba* (b) *aabbb* (c) *abbab*
(d) *bbaba* (e) *abbab*

19. *—c—bac—ba—cba—cb.*
(a) *bcaac* (b) *acccc* (c) *ccabc*
(d) *aabca* (e) *accbc*

20. *—ca—c—bab—c.*
(a) *abcab* (b) *baabc* (c) *abaac*
(d) *bcaab* (e) *abbca*

21. *ab—c—c—ac—b.*
(a) *bbcaa* (b) *abeab* (c) *bcabb*
(d) *abcca* (e) *abbca*

22. *a—bca—bbca—b—c.—*
(a) *abcbc* (b) *bbabb* (c) *aabab*
(d) *aaabc* (e) *bbaba*

23. *cb—a—c—ba—cb—aa.*
(a) *babab* (b) *abbaa* (c) *bcaba*
(d) *aabaa* (e) *abbaa*

24. *a—bc—aab—ccaa—bcc—ab.*
(a) *abcca* (b) *baabb* (c) *aabba*
(d) *bcbba* (e) *cbaab*

25. *a—bbaa—baa—baab—aab.*
(a) *abab* (b) *baba* (c) *abbb*
(d) *bbaa* (e) *aaab*

26. *—dan——nda—da—dand—n.*
(a) *ndanda* (b) *dnadna* (c) *ndanna*
(d) *anndna* (e) *danndn*

27. *—bam—amb—m—a—bam.*
(a) *mbabm* (b) *abmab* (c) *mabma*
(d) *ambbm* (e) *babmb*

28. *—abn—bna—n—bn——na.*
(a) *nabaab* (b) *bnaanb* (c) *abbnab*
(d) *nabbbn* (e) *anbbna*

29. *nd—n—b—db—db—d—nd*
(a) *abbnbd* (b) *bbbdnn* (c) *dnbdnb*
(d) *bdnnnb* (e) *andbdn*

30. *a—ba—bb—ab—aab—a—.*
(a) *abbbab* (b) *baabba* (c) *bbabb*
(d) *aabbaa* (e) *bbbbbb*

UNIT THREE

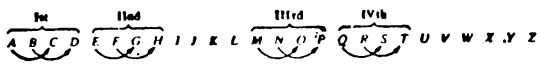
Sequence of Letters

BRIEF REVIEW OF CONCEPTS

The questions in this chapter are based on the relations between two groups of letters on each side of the sign : :. You have to find the relation or order in which the letters have been grouped together, and hence, the missing group of letters from the choice given below. The sequence or order in which the letters are grouped can be illustrated by the following examples.

● *BDAC : FHEG : : NPMO : ?*
(*a*) *RQTS* (*b*) *QTRS* (*c*) *TRQS*
(*d*) *RTQS* (*e*) *SRQT*

If we analyse the group of letters in the above question, we find that each group has four letters. Starting from the second alphabet *B*, the second letter *D* of the group *BDAC* has been taken by skipping *C*. The third letter has been taken by taking one step behind and then fourth letter is again taken by skipping the next one.

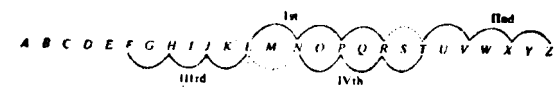


The second group starts in exactly the same way from the next letter after the Ist group ends. The third group starts from *M*, as it is given, and has the same order of letters, so the fourth group must start from the next letter after the IIIrd group ends and follow the same pattern. Therefore, the group which follows is *RTQS* and the answer is (*d*).
Alternative The above question may be illustrated as follows.

1. There are four continuous letters in the order III, I, IV, II.

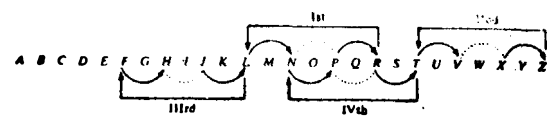
2. The second set starts with the next letter after the first set and follows the same pattern.

● *? : TVXZ : : FHJL : NPRT*
(*a*) *LNRP* (*b*) *LMOQ* (*c*) *LNPR*
(*d*) *NMPR* (*e*) *NLPR*



In this question, the first two letters of each group are not adjacent ; rather one letter is skipped. Like in *FHJL*, *G* is skipped between *F* and *H* and again, *K* is skipped between *J* and *L*. The third letter starts by skipping one after the second letter of the group, i.e. by skipping *I*, the third letter is *J*. The same pattern follows in *NPRT*. However, it is to be noted that the two groups on either side also have a difference of one letter, i.e. *FHJL* and *NPRT* have the difference of *M*. Therefore, all four letters in a group are in the forward order with a gap of one letter each. A similar pattern is followed in the left hand side too, and thus we get LNPR.

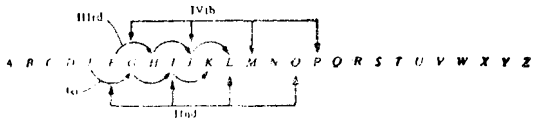
● *PRLN : XZTV : : JLFH : ?*
(*a*) *RTNP* (*b*) *NPRT* (*c*) *NRPT*
(*a*) *NTRP* (*e*) *RPNT*



Here, the second letter is obtained by shipping one letter forward, while the fourth is obtained by skipping one backward. The thirdck

ward. The order is 3412. The second group continues in the same fashion. Hence the answer is (a).

● *EGIK : FILO : : FHJL : ?*



(*a*) *JGMP* (*b*) *JGPM* (*c*) *GJPM*
(*d*) *GJMP* (*e*) *GMJP*

The 1st group is formed by skipping one letter forwards, whereas the second group starts with the letter next to the first letter of the 1st group and continues by skipping two letters forward. Hence, the answer is (d).

OBJECTIVE EVALUATION

1. *EFG : HIJ : : MNO : ?*
   (*a*) *STV* (*b*) *PQR* (*c*) *CDE*
   (*d*) *XYZ*
2. *CEG : EGC : : LNP : ?*
   (*a*) *LPN* (*b*) *UWY* (*c*) *NPL*
   (*d*) *MOP* (*e*) *VWY*
3. *NLO : RPS : : ? : XYZ*
   (a) *VUW* (b) *VTR* (c) *VTW*
   (d) *TRP* (e) *SRO*
4. *? :VXZ : : RTV : ?*
   (a) *DWY, SUW* (b) *UYM, RVT*
   (c) *TVX, QSU* (d) *UYM, QSU*
   (e) *TVX, RVT*
5. *? :IROL : : OLIR : UFCX*
   (a) *CYUF* (b) *CUXF*
   (c) *FUCX* (d) *CXUF*
   (e) *FCUX*
6. *AFKP : UZEP : : ? :VAFK*
   (a) *CGLQ* (b) *BHLQ*
   (c) *GCQL* (d) *BGLQ*
   (e) *BLGQ*
7. *? :BGLQ : : YDIN : VAFK*
   (a) *DJNT* (b) *EKNS*
   (c) *DKMT* (d) *DLMS*
   (e) *EJOT*
8. *? :JKHI : : TURS : OPMN*
   (a) *MNOP* (b) *LMNO*
   (c) *OPMN* (d) *NOLM*
   (e) *LMOP*
9. *MKQO ; LNPR : : ? :XYTZ*
   (a) *SVWY* (b) *VTWY*
   (c) *WYTS* (d) *XUSY*
   (e) *YSUW*
10. *AEFJ : KOPT : : ? :QUVZ*
    (a) *GLKP* (b) *GKLP*
    (c) *HKLP* (d) *HKQL*
    (e) *KLQM*
11. *YAWC : UESG : : QIOK : ?*
    (a) *MINC* (b) *MIKE*
    (c) *KOME* (d) *MMKO*
    (e) *LIME*
12. *BZDX : FVHT : : JRLP : ?*
    (a) *NNKL* (b) *NNLO*
    (c) *NNPL* (d) *NMLR*
    (e) *MNPT*
13. *ACFJ : OUBJ : : SUXB : ?*
    (a) *GNSA* (b) *GLQZ*
    (c) *GKPY* (d) *GORC*
    (e) *GMTB*
14. *? :WIUH : : ZKXJ : CMAL*
    (a) *FRTK* (b) *GTFK*
    (c) *FIKT* (d) *TGRF*
    (e) *TFEM*
15. *ACEG : DFHJ : : QSUW : ?*
    (a) *TVXZ* (b) *MNPR*
    (c) *OQST* (d) *KMNP*
    (e) *EGIJ*
16. *ZXV : WUS : : MKI : ?*
    (a) *OMK* (b) *VUS*
    (c) *UWY* (d) *ONL*
    (e) *KJG*
17. *LkJ: pon : : ? :hgf*
    (a) *dCb* (b) *DcB*
    (c) *dBc* (d) *dcb*
    (e) *Dbc*
18. *XgnF : EmgX : : ? :BacK*
    (a) *KcaC* (b) *AcKB*
    (c) *KcaB* (d) *KacC*
    (e) *KacB*
19. *CEGI : BDFH : : ? :LNPR*
    (a) *MNPR* (b) *NPRT*
    (c) *MOQS* (d) *SUWY*
    (e) *JLNB*
20. *CDEF : fghi : : ? klmn*
    (a) *hiJK* (b) *FGHI*
    (c) *NOPQ* (d) *HIJK*
    (e) *NopQ*

UNIT FOUR

Problems on Jumbled Letters

BRIEF REVIEW OF CONCEPTS

This chapter is based on a set of letters. Usually, there are five sets, one of them being different from the other four which are arranged according to some rule. Alternatively only one set may be arranged according to some rule while the other four are grouped without any order or relation.

● Find the set which is different from the other four.

(a) *EDCBA* (b) *ONMLK*
(c) *JIHGF* (d) *XWVUY*
(e) *TSRQP*

The four sets (a), (b), (c) and (e) are in alphabetical order, starting from the right but (d) is different. Hence, the answer is (d).

● Find the set which is different from the other four.

(a) *ACEGI* (b) *SUWYA*
(c) *LJNPR* (d) *BDFHJ*
(e) *KMOQS*

Here, the set (c) is different from the other four sets which are arranged in alphabetical order alternately (i.e. skipping one letter).

OBJECTIVE EVALUATION

In the following section, each question consists of five sets or group of letters in which one is different from the other four. Find the one which is different.

1. (a) *AZBZ* (b) *CXDW*
   (c) *EVFU* (d) *GTHS*
   (e) *QJRI*
2. (a) *CADGE* (b) *JHKNL*
   (c) *QORUS* (d) *XVYBZ*
   (e) *ECFCI*
3. (a) *CHLOQ* (b) *JOSVX*
   (c) *RWACF* (d) *FXORT*
   (e) *UZDGH*
4. (a) *ADBEC* (b) *FIGJH*
   (c) *KNLOM* (d) *PSQTR*
   (e) *UVXYW*
5. (a) *AEDCB* (b) *GKJIH*
   (c) *MQPON* (d) *PRSTQ*
   (e) *SWVUT*
6. (a) *PROQN* (b) *GIFHE*
   (c) *KMJLI* (d) *MOLNK*
   (e) *DFCEG*
7. (a) *BFCGD* (b) *JNKOL*
   (c) *YCDZA* (d) *NROSP*
   (e) *LPMQN*
8. (a) *ACEGF* (b) *FHJLK*
   (c) *KMOQP* (d) *PRTVU*
   (e) *UWYZA*
9. (a) *ZAYBX* (b) *XCWDV*
   (c) *VEUFT* (d) *TGSHR*
   (e) *RIQJP*
10. (a) *VDXB* (b) *IPKR*
    (c) *OKQI* (d) *CWEU*
    (e) *HRJP*
11. (a) *MLON* (b) *VCXE*
    (c) *OJQL* (d) *PIRK*
    (e) *JQPK*
12. (a) *WDCX* (b) *MNMN*
    (c) *HSRI* (d) *PJQK*
    (e) *OLKP*
13. (a) *TGFU* (b) *CXVE*
    (c) *QJHS* (d) *UFDW*
    (e) *LOMN*
14. (a) *UDWF* (b) *GRIT*
    (c) *PLOK* (d) *NKPM*
    (e) *BWDY*
15. (a) *REWSNA* (b) *ESICREXE*
    (c) *ELPMAXE* (d) *TEBAHPLA*
    (e) *STUVGHI*

16. (a) *SEGNAG* (b) *ANUMAY* (c) *IREVAK* (d) *JELTUS* (e) *SUNFIL*

17. (a) *CDFBE* (b) *KLMXO* (c) *TNPLI* (d) *QTJGA* (e) *RBCSN*

18. (a) *NODNOL* (b) *LOOPREVIL* (c) *SEMAHT* (d) *RETSEHCNAM* (e) *OGNAM*

19. (a) *BDFHJ* (b) *PRTVX* (c) *LNPRT* (d) *GIKMO* (e) *FGHPQ*

20. (a) *PRTSQ* (b) *CEGFD* (c) *HJLKI* (d) *SUWVT* (e) *EGHIF*

21. (a) *VwUx* (b) *SuRT* (c) *BdAc* (d) *PrOQ* (e) *FWEG*

22. (a) *ReHToRB* (b) *ReHToM* (c) *ReTSiS* (d) *DNeiRF* (e) *RETHAF*

23. (a) *PQNTP* (b) *UOIEA* (c) *STCPO* (d) *INXWV* (e) *TPSAG*

24. (a) *ABCDG* (b) *ACEBI* (c) *PRSTU* (d) *NOUVW* (e) *ACOST*

25. (a) *SUVNQT* (b) *RSTPNG* (c) *REWOLF* (d) *INDGMO* (e) *XTUVNM*

UNIT FIVE

Mathematical Aptitude I

BRIEF REVIEW OF CONCEPTS

Some questions are based on numerical problems. Candidates are supposed to do simple mental calculations, i.e. multiplication, division or square root, and mark the correct answer from the choice given below.

- $\frac{5}{?}=\frac{?}{1.25}$

(a) 0.0025 (b) 0.025 (c) 0.25
(d) 2.5 (e) 1.5

The answer is (d), i.e. 2.5, because $\frac{5}{2.5}=2$ and $\frac{2.5}{1.25}=2$

Alternately, put X in both blank spaces so that $X \times X = 1.25 \times 5$

$\therefore \quad X = 2.5$

- $\frac{\sqrt{1296}}{?}=\frac{?}{2.25}$

(a) 6 (b) 7 (c) 8
(d) 9 (e) 10

The answer is (d), i.e. 9, because $\frac{\sqrt{1296}}{9}=4$ and $\frac{9}{2.25}=4$.

Or, put X in both blank space, so that

$$X^2=\sqrt{1296}\times 2.25$$
$$\therefore \quad X=9.$$

OBJECTIVE EVALUATION

The following questions are based on simple numerical problems. Find one number from the given choice which can fill the two blank places.

1. $\frac{50}{?}=\frac{?}{12\frac{1}{2}}$

(a) 25/2 (b) 4/25 (c) 4
(d) 25 (e) 5/25

2. $\frac{21}{?}=\frac{?}{2\frac{1}{3}}$

(a) 4/3 (b) 7/3 (c) 7 1/3
(d) 7 2/3 (e) 7

3. $\frac{0.27}{?}=\frac{?}{0.03}$

(a) 9.00 (b) 0.99 (c) 0.09
(d) 0.19 (e) 0.90

4. $\frac{1.005}{?} = \frac{?}{4.02}$

(a) 2.04 (b) 2.05 (c) 2.02
(d) 4.01 (e) 2.01

5. $\frac{9.09}{?} = \frac{?}{0.112}$

(a) 1.10 (b) 1.11 (c) 1.01
(d) 1.02 (e) 1.03

6. $\frac{1.44}{?} = \frac{?}{0.01}$

(a) 0.112 (b) 1.12 (c) 0.12
(d) 0.012 (e) 2.40

7. $\frac{\sqrt{625}}{?} = \frac{?}{16}$

(a) .025 (b) 2.05
(c) 0.025 (d) 20.0
(e) 0.125

8. $\frac{1.21}{?} = \frac{?}{1}$

(a) 1.01 (b) 0.011
(c) 0.10 (d) 2.10

9. $\frac{2.7}{?} = \frac{?}{7.5}$

(a) 5.25 (b) 0.525
(c) 4.50 (d) 4.05
(e) 5.40

10. $\frac{(0.02)^3}{?} = \frac{?}{2^3}$

(a) 0.0008 (b) 0.08
(c) 8.00 (d) 0 008
(e) 0 80

11. $\frac{0.4^2 - 0.3^2}{?} = \frac{?}{0.07}$

(a) 0.71 (b) 0 07 (c) 0.70
(d) 2.7 (e) 7.0

12. $\frac{1/25}{?} = \frac{?}{1/400}$

(a) .04 (b) 4.0 (c) 4.25
(d) 0.01 (e) 0.001

13. $\frac{\sqrt{2.56}}{?} = \frac{?}{0\ 1}$

(a) 0.04 (b) 0.004 (c) 4.0
(d) 0.4 (e) 0.16

14. $\frac{\sqrt{0.36}}{?} = \frac{?}{0.006}$

(a) 0.09 (b) 0.06 (c) 0.012
(d) 0.60 (e) 0.12

15. $\frac{\sqrt{2.25}}{?} = \frac{?}{3.75}$

(a) 7.25 (b) 1.25 (c) 2.25
(d) 0.75 (e) 7.50

16. $\frac{?}{0.25} = \frac{0.01}{?}$

(a) 0.005 (b) 0.05 (c) 5.0
(d) 0.01 (e) 5.05

17. $\frac{?}{0.24} = \frac{6}{?}$

(a) .4 (b) 0.24 (c) 0.12
(d) 12 (e) 0.04

18. $\frac{0.63}{?} = \frac{?}{0.007}$

(a) 0.023 (b) 0.23 (c) 0.021
(d) 30.0 (e) 0.

19. $\frac{0.40 \times 0.001}{0.02} = ?$

(a) 0 2 (b) (c) 0.002
(d) 0.0002 (e) 0.00002

20. $\frac{0\ 9 \times 0.01 \times 0.03}{0.27} = ?$

(a) 0.0001 (b) 0.001 (c) 0.01
(d) 0.1 (e) 1.01

UNIT SIX

Mathematical Aptitude II

BRIEF REVIEW OF CONCEPTS

This unit is based on mathematical calculations. New operations are assigned to old symbols, e.g.

$\div$	equal to
$\times$	less than
$+$	greater than
$-$	multiplication
$>$	division
$<$	addition
$=$	subtraction

Candidates are supposed to identify the given expressions and say which one of them is true from the choice given below.

● Which one of the following is true ?

(a) $2\times3<5-9>3-18+10$
(b) $2\times3>5-9<3-18\times10$
(c) $2\times3<5+9>3+18-10$
(d) $2\times3<5\times9>3+18-10$
(e) $2\times3<5\times9\div3+18-10$

The answer is (a) because the expression can be written according to given condition as

$2<3+5\times9\div3\times18>10$
or, $2<3+5\times3\times18>10$
or, $2<270>10$ True

OBJECTIVE EVALUATION

If

$\div$	equal to
$\times$	less than
$+$	greater than
$-$	multiplication
$>$	division
$<$	addition
$=$	subtraction

identify the correct expression in each question

1. (a) $1\times3>2+1\times5\div3-1>2$
   (b) $1-3>2+1\div5\times3-1>2$
   (c) $1-3>2+1\times5=3\times1>2$
   (d) $1-3>2+1-5=3-2<2$
   (e) $1-3>2+1\times5+3-1>2$
2. (a) $35<2-20-5+35\div7=5\times30$
   (b) $35<2\times20-5+35=7\div5=30$
   (c) $35<2-20=5\ \ 35\div7\div5\times30$
   (d) $35<2-20=5+5>7\div35=30$
   (e) $35<2\times20=5+35>7+5=30$
3. (a) $7<5-2-3\times9>5<3>1\div8$
   (b) $7<5-2=3\times19+5<3>1\div8$
   (c) $7<5-2=3\div19>5<3>1\div8$
   (d) $7<5-2=3\times19>5+3\div1=8$
   (e) $7<5\times2=3<19+5<3>1+8$
4. (a) $1\times2+3-1=4\times1\div1$
   (b) $1+3\times2-1<1\times4\div1$
   (c) $3+2\times1+1>1-4\times1$
   (d) $1-2<3=1\div4-1>1$
   (e) $2+1-3\times1=1\div4\times1$
5. (a) $2\times2\div4>2-2-1$
   (b) $2\ \ 2>4+2>2\ \ 2$
   (c) $2-2\leqslant4+2-2=2$
   (d) $2-4>4\div2-2+2$
   (e) $2+2-2=4\div2-2$
6. (a) $1\div1\times1+1>1-1+1\div1$
   (b) $1\times1\div1=1-1+1\div1$
   (c) $1-1+1\times1=1\times1\div1+1$
   (d) $1>1-1<1+1=1<1>1$
   (e) $1+1\times1-1\div1\times1+1-1\times1$
7. (a) $9+9-9\div9=9\div9-9+9$
   (b) $9<9+9\times9=9-9\times9+9$
   (c) $9-9\times9+9=9<9+9\times9$
   (d) $9\times9\times9<9=9>9+9\times9$
   (e) $9<9=9>9\div9>9=9<9$
8. (a) $1+2+3=3\times2\times1=1-2+3$
   (b) $3+2\times1>1\times2+3>1+2+3$
   (c) $3-2-1<3-2+1<1+2-3$
   (d) $1+2-3<1+3-2<1+2+3$
   (e) $1<2=3\times1<3=2\times1<2<3$

In the following questions if

$\div$	equal to
$\times$	not greater than
$+$	less than
ϕ	not less than
$\square$	greater than
$\triangle$	not equal to

find the correct answer for the following questions.

9. $a \triangle b+c$ does not imply

(a) $a \square b \times c$ (b) $a \triangle b \square c$
(c) $a \phi b \triangle c$ (d) $a \times b \times c$
(e) $a + b \triangle c$

10. $a \div b \square c$ it implies
(a) $a \div b + c$ (b) $a \square b + c$
(c) $a \div b \times c$ (d) $a + b \triangle c$
(e) $a \div b \phi c$

11. $a + b \triangle c$ does not imply
(a) $a \wedge b \div c$ (b) $a \times b \square c$
(c) $a \triangle b \square c$ (d) $a + b \phi c$
(e) $a \triangle b \triangle c$

12. $a \triangle b \triangle c$ implies
(a) $a \phi b \triangle c$ (b) $a \phi b + c$
(c) $a + b \times c$ (d) $a \times b \times c$
(e) $a \triangle b \phi c$

13. $a + b \triangle c$ does not imply
(a) $a \triangle b \times c$ (b) $a \triangle b + c$
(c) $a \times b + c$ (d) $a + b \triangle c$
(e) $a \div b \phi c$

14. $a + b \square c$ implies
(a) $a \times b + c$ (b) $a \div b \phi c$
(c) $a \phi b \times c$ (d) $a \times b \phi c$
(e) $a \triangle b \times c$

15. $a \phi b \times c$ does not imply
(a) $a \triangle b + c$ (b) $a \phi b \div c$
(c) $a \triangle b \square c$ (d) $a \div b \div c$
(e) $a \square b \div c$

16. $a \div b \phi c$ does not imply
(a) $a \div b \phi c$ (b) $a \phi b \div c$
(c) $a \times b \times c$ (d) $a \times b \triangle c$
(e) $a + b \times c$

In the following questions if
$\div$ less than
$\not\vee$ not greater than
$\triangle$ not equal to
$\times$ equal to
$+$ greater than
$-$ not less than

17. The expression $a - b + c$ implies
(a) $a \div b \times c$ (b) $b \div a \div c$
(c) $a + b \triangle c$ (d) $b + c + a$
(e) $c + b - a$

18. The expression $a + b + c$ implies
(a) $a \div b \times c$ (b) $c + b - a$
(c) $a \times b \times c$ (d) $c - b - a$
(e) $c \vee b \div a$

19. The expression $a \div b \times c$ does not imply
(a) $a \vee b \vee c$ (b) $a \vee b \times c$
(c) $a - b \times c$ (d) $b \times c - a$
(e) $a - b + c$

20. The expression $a \triangle b \vee c$ implies
(a) $a - b + c$ (b) $a - b \times c$
(c) $a \times b \triangle c$ (d) $a + b - c$
(e) $a \times b - c$

If $\times$ greater than
ϕ equal to
$\not<$ not less than
$\perp$ not equal to
$\triangle$ less than
$+$ not greater than
find the correct answer to each of the following questions from the given choice.

21. If $a \times b \triangle c$, it follows that
(a) $a \phi c \triangle b$ (b) $b < a \times c$
(c) $a < b + c$ (d) $c + b < a$
(e) $b < a \phi c$

22. $a + b + c$ does not imply
(a) $a \triangle b \times c$ (b) $b \triangle c \times a$
(c) $a \times c \triangle b$ (d) $c \times b \triangle a$
(e) $b \times a \times b \times a \phi c$

23. $a \triangle b \triangle c$ does not imply
(a) $b \times c \triangle c$ (b) $c \times b \times a$
(c) $a \triangle c \times b$ (d) $a \times c \times b$
(e) $b + a \triangle c$

24. $a + b + c$ implies
(a) $a \phi b \triangle c$ (b) $c \phi b \triangle a$
(c) $a \triangle b \triangle c$ (d) $a \triangle b \phi c$
(e) $a \phi b \phi e$

25. $a < b \times c$ implies
(a) $a \times c + b$ (b) $c \times b \times a$
(c) $b \times a \times c$ (d) $a \triangle b < c$
(e) $a < b \phi c$

In the following questions some relationships have been expressed through symbols, as defined below.

$+$ $-$ $\times$ $-$ $=$ $>$ $<$
V $\wedge$ ( ) $\cup$ $\cap$ 0

Find the correct relation from the given choice in each of the following questions.

26. (a) 24 (3 $\cup$ 4) 2 $\cap$ 8
(b) 24 (3 $\cup$ 4) 2 V 8
(c) 24) 3 V 402 V 8
(d) 24 $\wedge$ 3) 4 $\cup$ 2 (8
(e) 24) 3 $\cap$ 4 V 2 (8

27. (a) 24) 3 V 4 $\cap$ 2 (8
(b) 24 (3) 4 $\wedge$ 208
(c) 24 $\cap$ 3 $\cup$ 4) 2 V 8
(d) 24) 3 $\cap$ 4)2 $\wedge$ 8
(e) 24 V 304 (2 $\wedge$ 8

28. (a) 24 $\wedge$ 3 (4 V 2) 8
(b) 24 $\cup$ 3 V 4 $\wedge$ 2 (8
(c) 24 (304) 2 V 8
(d) 2403 (4 $\wedge$ 2 V 8
(e) 24 Δ 3 V 4 $\cup$ 2 (8

29. (a) 24 V 3 (4) 2 ∪ 8
(b) 24) 3 (∩ 2 V 8
(c) 24 ∧ 3) 4 ∪ 2 V 8
(d) 24 ∧ 3 ∪ 4) 2 (8
(e) 24 ∧ 3) 402) 8

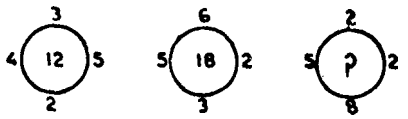
30. (a) 24 (3 V 4) 208
(b) 24) 3 ∩ 4 V 2 (8
(c) 24) 3 ∩ 4 ∧ 2 (8
(d) 24 (3 ∪ 4 ∩ 2) 8
(e) 24 U 3 (4 ∧ 2 V 8

UNIT SEVEN

Numbers Round the Circle

BRIEF REVIEW OF CONCEPTS

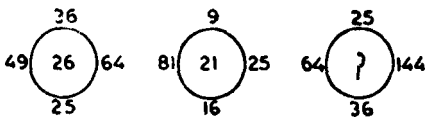
This unit is also based on numerical calculations. Usually there are circles, the first two of which have four numbers at four points on the circle and one inside the circle. These numbers are placed according to some rule or sequence. The third circle has any four numbers with the fifth missing. Candidates are required to find this number from the given choice, according to the same rule as the other two circles.



(a) 12 (b) 14 (c) 16
(d) 18 (e) 20

The answer to the above question is (c) i.e. 16, because the numbers inside the first two circles are obtained by multiplying the outside numbers and dividing by 10, e.g. $5\times3\times4\times2/10=120/10=12$. The same follows for the second and third circles.

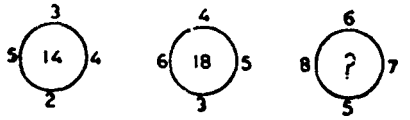
●



(a) 24 (b) 25 (c) 23
(d) 21 (e) 19

The answer is (d), i.e. 21, because the numbers inside the first two circles are obtained by taking the sum of the square roots of the four numbers outside the circles, e.g. $\sqrt{49}+\sqrt{64}+\sqrt{25}+\sqrt{36}=7+8+5+6=26$ (Ist Circle) and $\sqrt{16}+\sqrt{25}+\sqrt{9}+\sqrt{81}=4+5+3+9=21$ (IInd Circle).

●



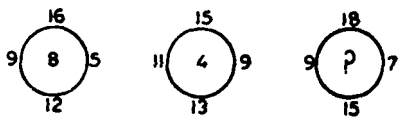
(a) 24 (b) 26 (c) 28
(d) 22 (e) 30

The answer is 2, i e. 26, because the numbers inside the first two circles are obtained by taking the sum of the differences of the squares of the opposite extremes, e.g. $(5^2-4^2)+(3^2-2^2)=14$, etc.

OBJECTIVE EVALUATION

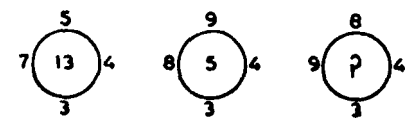
In the following questions there are three circles in each question. The first two circles have five numbers. one inside and four outside, at four points. These numbers are arranged according to a particular rule; while in the third circle one of the five numbers is missing. Find the missing number from the choice given below.

1.

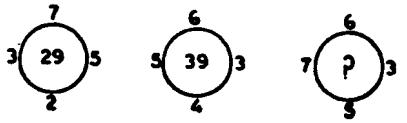


(a) 12 (b) 8 (c) 4
(d) 2 (e) 5

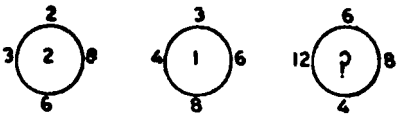
2.



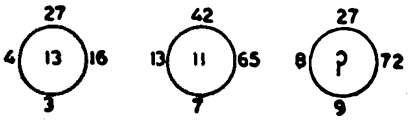
(a) 4 (b) 8 (c) 12
(d) 15 (e) 18

3. 

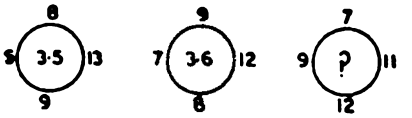
(a) 49 (b) 51 (c) 59
(d) 21 (e) 35

4. 

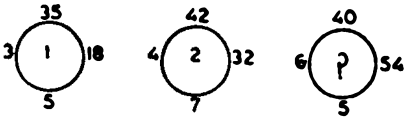
(a) 3 (b) 4 (c) 5
(d) 6 (e) 8

5. 

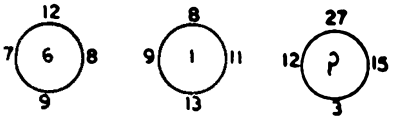
(a) 9 (b) 12 (c) 15
(d) 18 (e) 6

6. 

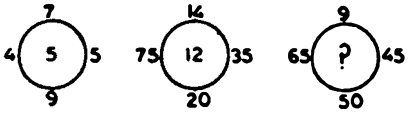
(a) 3.7 (b) 3.8 (c) 3.9
(d) 3.10 (e) 3.4

7. 

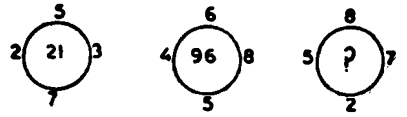
(a) 0 (b) 1 (c) 3
(d) 5 (e) 4

8. 

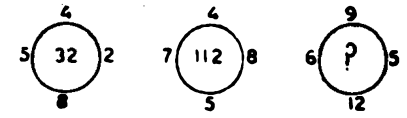
(a) 1 (b) 2 (c) 3
(d) 5 (e) 7

9. 

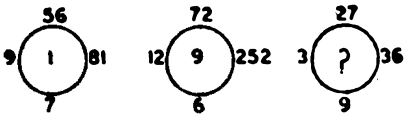
(a) 7 (b) 9 (c) 13
(d) 15 (e) 17

10. 

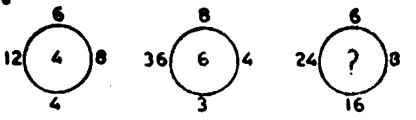
(a) 24 (b) 36 (c) 65
(d) 56 (e) 64

11. 

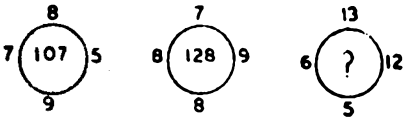
(a) 416 (b) 624 (c) 324
(d) 196 (e) 164

12. 

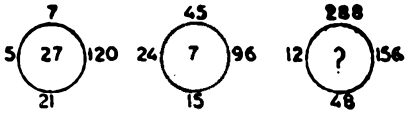
(a) 6 (b) 3 (c) 9
(d) 12 (e) 15

13. 

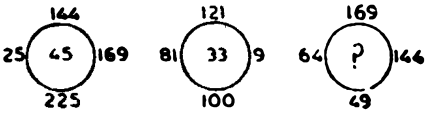
(a) 2 (b) 4 (c) 8
(d) 12 (e) 16

14. 

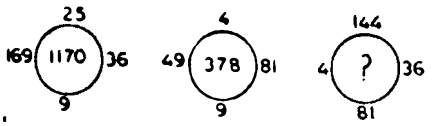
(a) 147 (b) 137 (c) 120
(d) 124 (e) 152

15. 

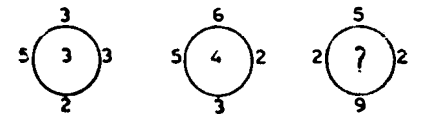
(a) 12 (b) 24 (c) 18
(d) 19 (e) 21

16. 

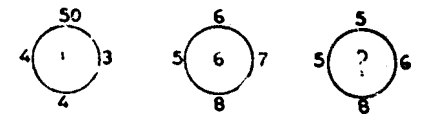
(a) 38 (b) 36 (c) 24
(d) 40 (e) 44

17. 

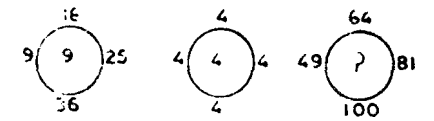
(a) 1050 (b) 1256 (c) 1296
(d) 1260 (e) 1156

18. 

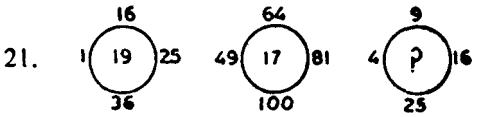
(a) 5 (b) 6 (c) 7
(d) 8 (e) 9

19. 

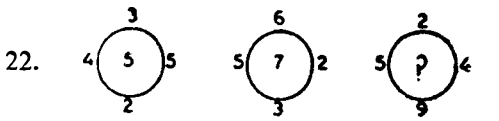
(a) 3 (b) 4 (c) 5
(d) 6 (e) 8

20. 

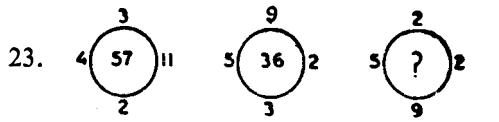
(a) 15 (b) 16 (c) 17
(d) 18 (e) 20

21. 

(a) 6 (b) 7 (c) 8
(d) 9 (e) 10

22. 

(a) 8 (b) 9 (c) 10
(d) 11 (e) 12

23. 

(a) 37 (b) 45 (c) 47
(d) 55 (e) 77

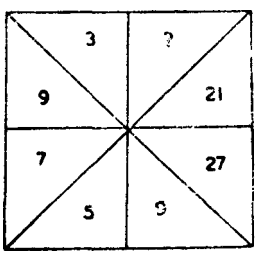
UNIT EIGHT

Numbers in Squares or Cells

BRIEF REVIEW OF CONCEPTS

In these types of questions, numbers are arranged according to some rule in the cells made into a square. One cell is left empty. Candidates are required to find the way the numbers are arranged and mark the answer from the choice given below.

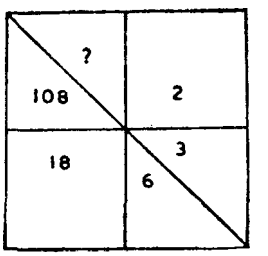
●



(a) 12 (b) 15 (c) 30
(d) 28 (e) 16

The answer is 15 because the numbers in opposite cells are 3-times or 1/3 each other, e.g. $7 \times 3 = 21$, $3 \times 3 = 9$, $9 \times 3 = 27$
$\therefore$ $5 \times 3 = 15$

●



(a) 1 (b) 36 (c) 216
(d) 1944 (e) 126

The answer is 1944 as the numbers are arranged in the following way,

$2\times3=6,\ 3\times6=18,\ 6\times18=108,$
$18\times108=1944$

●

7	6	5
3	3	4
2	3	?

(a) 12 (b) 3 (c) 4
(d) 5 (e) 16

The answer is 3 because the sum of the numbers in each column is 12.

●

32	35	39
40	45	51
2	8	?

(a) 11 (b) 90 (c) 60
(d) 14 (e) 95

The answer is 14 because the numbers are increasing by 3 and 4 in the first row, 4 and 5 in the second row and 5 and 6 in the third row.

●

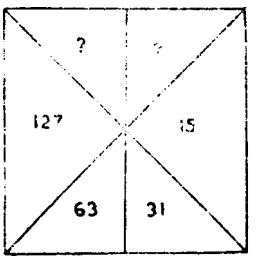
7	9	16
4	15	?
13	8	21

(a) 29 (b) 19 (c) 23
(d) 25 (e) 24

The answer is 19 because the sum of the first two numbers in each row gives the third number, i.e.

$7+9=16,\ 4+15=19,\ 13+8=21.$

●



(a) 255 (b) 440 (c) 190
(d) 250 (e) 864

The answer is 255 as the number is doubled and increased by 1 in each cell, starting from 7, i.e.

$7\times2=14+1=15$
$15\times2=30+1=31$
$31\times2=62+1=63$
$63\times2=126+1=127$
$\therefore\ 127\times2=254+1=255$

OBJECTIVE EVALUATION

In the following questions a square is divided into many cells and the numbers in the cells are placed according to some rule, except one. Find the number, from the given choice, which can be placed in the cells which is marked '?'.

1

15	10	5
17	12	7
18	13	?

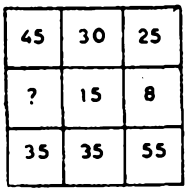
(a) 5 (b) 6 (c) 12
(d) 18 (e) 8

2.

5	2	?
8	19	9
12	4	16

(a) 6 (b) 1 (c) 2
(d) 3 (e) 4

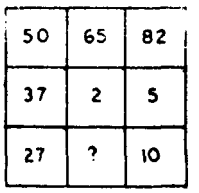
3.



45	30	25
?	15	8
35	35	55

(a) 5 (b) 7 (c) 9
(d) 11 (e) none of these

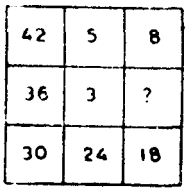
4.



50	65	82
37	2	5
27	?	10

(a) 13 (b) 14 (c) 15
(d) 16 (e) 17

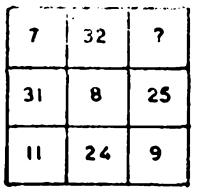
5.



42	5	8
36	3	?
30	24	18

(a) 10 (b) 11 (c) 12
(d) 13 (e) 14

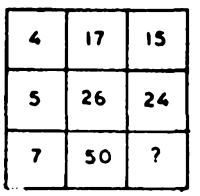
6.



7	32	?
31	8	25
11	24	9

(a) 47 (b) 48 (c) 49
(d) 50 (e) 51

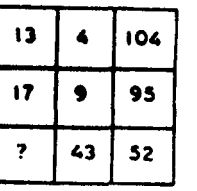
7.



4	17	15
5	26	24
7	50	?

(a) 45 (b) 44 (c) 46
(d) 47 (e) 48

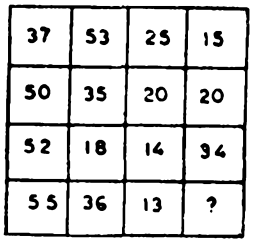
8.



13	4	104
17	9	95
?	43	52

(a) 24 (b) 26 (c) 36
(d) 85 (e) 120

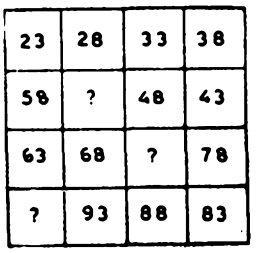
9.



37	53	25	15
50	35	20	20
52	18	14	34
55	36	13	?

(a) 12 (b) 11 (c) 13
(d) 14 (e) 16

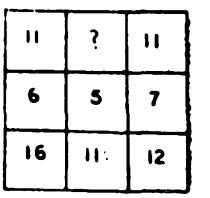
10.



23	28	33	38
58	?	48	43
63	68	?	78
?	93	88	83

(a) 52, 96, 85, respectively for 2nd, 3rd and 4th row.
(b) 54, 74, 96, respectively for 2nd, 3rd and 4th row.
(c) 50, 65, 105, respectively for 2nd, 3rd and 4th row.
(d) 53, 73, 98, respectively for 2nd, 3rd and 4th row.
(e) None of these.

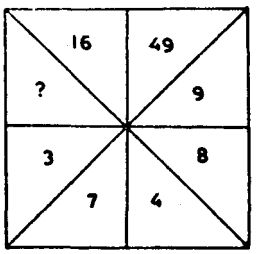
11.



11	?	11
6	5	7
16	11	12

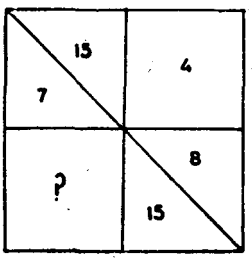
(a) 4 (b) 6 (c) 8
(d) 12 (e) 16

12.



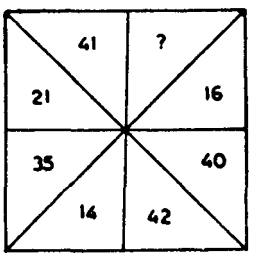
(a) 56 (b) 49 (c) 64
(d) 96 (e) 25

13.



(a) 5 (b) 7 (c) 12
(d) 9 (e) 11

14.



(a) 10 (b) 12 (c) 15
(d) 18 (e) 20

15.

20	24	25	?
27	29	28	24
36	24	42	12
?	36	38	20

(a) 24 and 5 respectively in first and fourth row.
(b) 25 and 4 respectively in first and fourth row.
(c) 23 and 4 respectively in first and fourth row.
(d) 5 and 26 respectively in first and fourth row.
(e) 20 and 8 respectively in first and fourth row.

UNIT NINE

Coding-Decoding I

BRIEF REVIEW OF CONCEPTS

In these types of questions, some words or groups of letters are given in symbolic representation, which may be the English alphabet or any other notation. Candidates are required to find the notation or symbol for each letter of the word given and then use them to find the code for a given word.

• For example, there are some words in column I which are coded in column II. The code letters in column II are not arranged in the order in column I.

Column I	*Column II*
QUALIFY	*yxiqbsm*
LOAD	*mxkt*
BUS	*sdo*
PLUME	*snvwx*
WAX	*phm*
JACK	*aelm*
FETCH	*ztifu*
ZIP	*wry*
VECTOR	*cfglnt*
RIGOUR	*tcscjy*

Express the following words in code.
(a) STOCK (b) THOUGHT
(c) REPLY (d) JUSTICE
(e) INFLUX

Answer :
(a) STOCK, in code, is *dftla*.
(b) THOUGHT, in code, is *fztsjzf*.
(c) REPLY, in code, is *cnwxq*.
(d) JUSTICE, in code, is *esdfyln*.
(e) INFLUX, in code, is *yuzxsp*.

Now, if we study the words given in column I and their symbolic representation, we can easily find the symbolic value of each letter. Symbolic values of some letters are, however, not mentioned. These have to be picked from the answer itself. For instance, in the case of REPLY, symbols for R, E, P and L can easily be found out, then only *q* could possibly stand for Y.

OBJECTIVE EVALUATION

Find the codes for the following words from the choice given below, using the table given in the example.

1. IDEAL
(a) *kmyde* (b) *yknmx* (c) *klcnd*
(d) *novmp* (e) *yxkbo*

2. WOMB
(a) *oknib* (b) *vqmn* (c) *hvol*
(d) *htvo* (e) *vtng*

3. QUACK
(a) *bmktr* (b) *bsuac* (c) *baqcd*
(d) *blmck* (c) *bsmla*

4. LIZARD
(a) *dramkc* (b) *ucrmck* (c) *rxyjuc*
(d) *xyrmzk* (e) *xylmkt*

5. VAUNT
(a) *gmsuf* (b) *nuatv* (c) *gnmuf*
(d) *nmstf* (e) *gmunt*

6. STAMP
(a) *nstfu* (b) *gmnug* (c) *dmust*
(d) *dfmvw* (e) *fmvtd*

7. STOP
(a) *mcyw* (b) *fwts* (c) *dftw*
(d) *turw* (e) *gminc*

8. NOTICE
(a) *kvfigt* (b) *gmunfy* (c) *utfyln*
(d) *fiyluy* (e) *esdfyn*

9. CAMPUS
(a) *lmvbqd* (b) *bqaefg* (c) *jxlrmf*
(d) *lmvwsd* (e) *ftuvmn*

10. MINUTES
(a) *vyufncg* (b) *ywncmgf* (c) *fycmwmn*
(d) *vyufnd*

11. QUESTION
(a) *bsufydta* (b) *kvfibqae* (c) *bsnafytu*
(d) *ftyimcdx* (e) *stncyrkv*

12. SHELF
(a) *dzmpw* (b) *dznxi* (c) *umzft*
(d) *dznfg* (e) *aebqa*

13. BEAUTIFY
(a) *dnmvfigq* (b) *dnsfigkv* (c) *bqaefyxp*
(d) *vymnfcyx* (e) *onmsfyiq*

14. JUSTIFY
(a) *eabqfyi* (b) *esdfyiq* (c) *vymnfcx*
(d) *dzmnwvq* (e) *esdfbyq*

15. DELUXE
(a) *knxewy* (b) *knfgfq* (c) *knmspx*
(d) *knxspn* (e) *knabfw*

16. GREEN
(a) *jxpqr* (b) *jcfgy* (c) *icmnf*
(d) *jcnnu* (e) *jcuae*

17. PLEASURE
(a) *wxrpqgfn* (b) *wxmnfscm*
(c) *wxmpqfcn* (d) *wxmnscpq*
(e) *wxnmdscn*

18. ENERGY
(a) *nmnfq* (b) *nuncjq* (c) *nucjxq*
(d) *nunjqp* (e) *vyusfq*

19. POWER
(a) *wtmnc* (b) *wnnpq* (c) *wthnc*
(d) *vystq* (e) *cxpmt*

20. MEDICAL
(a) *vnlmfgy* (b) *vnmyxpy*
(c) *vnkylmx* (d) *vgfylmn*
(e) *vnrgfpq*

21. DELHI
(a) *kngzv* (b) *knmzy* (c) *kzczy*
(d) *knxzv* (e) *knpzy*

22. PATNA
(a) *wmnum* (b) *wmgum* (c) *wmzum*

(d) *wmfum* (e) *wnmpq*

23. PHYSICS
(a) *wzmpnfd* (b) *whmnqrs* (c) *wzqdyld*
(d) *wsqpmld* (e) *wmzrsqd*

24. PANAMA
(a) *wuv* (b) *wapqfu* (c) *wmuunu*
(d) *wmumvm* (e) *wnumvy*

25. CRICKET
(a) *lcylanf* (b) *lcamuvf* (c) *lcmnvuf*
(d) *lpqrstf* (e) *lsprqgt*

26. TENNIS
(a) *fnuuyd* (b) *fnmmfd* (c) *fupqgd*
(d) *fpqrst* (e) *pqwumu*

27. MARXISM
(a) *vmpqrdv* (b) *vmqfrvd* (c) *vmugfpr*
(d) *vmcaedv* (e) *vmcpydv*

28. VENICE
(a) *gmupqn* (b) *gnmynf* (c) *gnuyln*
(d) *gnrstn* (e) *qnaeln*

29. GRACE
(a) *jcpqn* (b) *jcmln* (c) *jcfgn*
(d) *jmqrn* (e) *jalsn*

30. MAJESTIC
(a) *vmgfpmnl* (b) *vyjalsnl* (c) *vpqrstyl*
(d) *vmaestyl* (e) *vmendfyl*

UNIT TEN

Coding-Decoding II

BRIEF REVIEW OF CONCEPTS

In this section questions based on coding/decoding will be solved using different rules depending upon the nature of the question.

● If ROSE is coded *TQUG*, BLUE will be coded as,
(a) *YQSF* (b) *DMVF* (c) *CDFG*
(d) *DNWG* (e) *DMQF*

The answer is (d) *DNWG* because, for each letter in the word ROSE, the letter used in the code is the third in alphabetical order, i.e.
T for R *T* is the 3rd letter from R
Q for O *Q* is the 3rd letter from Q
U for S *U* is the 3rd letter from S
G for E *G* is the 3rd letter from E

● If BLACK is coded *CMBDL*, SWEET will be coded,
(a) *UVFFV* (b) *TXFFU* (c) *TXEEU*
(d) *SXFFT* (e) *TEEWS*

Obviously the answeris (b) *TXFFU* because the code letters are next to each letter used in the word BLACK in alphabetical order.

● If *AB* means 25, *BC* means 57 and *BD* means58, what does *CADB* mean?
(a) 7825 (b) 2578 (c) 7285
(d) 5827

The answer is (c) 7285 because, from the above question, it i clear that,
B=5, *A*=2, *C*=7, *D*=8

● If *AIDNI* stands for INDIA then the code for CAPITAL is
(a) *APICTAL* (b) *LAPICAT*
(c) *LATIPAC* (d) *LAPITAC*
(e) *LATIPAC*

The answer is obviously (c) *LATIPAC* because, when INDIA is written in reverse order, it is *AIDNI*.

● If WORK is coded 4567 and MAN 328, then WOMAN is coded,
(a) 43528 (b) 82354 (c) 32845
(d) 35428 (e) 45328

The answer is obviously (e) 45328 because the code for W is 4, for O is 5, for R is 6, for K is 7, for M is 3, for A is 2 and for N is 8.

● If the word CONTENT is coded in five different ways, using different rules, as
(a) *DPOUFOU* (b) *TNETNOC*
(c) *EQPVGPV* (d) *XLMGVMG*
(e) *UOFUOPD*

find out the rules and which one of them has been applied in coding each of the following questions.

Word	*Code*	*Rule No.*
FRANCE		
NOTION		
ORIENT		
CHARMING		
ROCK		

Answer. The word CONTENT is coded in the following five ways.

(i) Each letter in the code follows the respective letter in the word CONTENT, like *D* follows C, *P* follows O and *O* follows N, etc. Hence CONTENT can be coded as *DPOUFOU*.

(ii) CONTENT is written in the reverse order, i.e. starting from the right, i.e. *TNETNOC*.

(iii) The letters in the code follow the letter next to each used in the word CONTENT, i.e. *E* follows D which is next to C, *Q* follows P which is next to O, *P* follows O which is next to N, and so on.

(iv) The alphabets from A to Z are divided into two parts, i.e.
A B C D E F G H I J K L M
Z Y X W V U T S R Q P O N

Here A corresponds Z, B corresponds Y, C corresponds X, or vice versa, and so on. Hence CONTENT is coded in the corresponding letters.

(v) The letters in the code are those which follow the respective letters in the word, but written in reverse order as *D* follows C, *P* follows O, *O* follows N, and so on.

However, in code, *DPOUFOU* is written in the reverse order, hence it *UOFUOPD*.

OBJECTIVE EVALUATION

1. If 123 stands for 987, then 234 stands for,
   (a) 785 (b) 586 (c) 768
   (d) 876 (e) None of these
2. If $4\times3=13$ and $5\times3=16$, then $6\times3=$...
   (a) 18 (b) 20 (c) 21
   (d) 19 (e) None of these
3. If $2+3=32$, $4+5=54$ and $6+8=86$, then 586 can be written as
   (a) $4+8+6$ (b) $4+3+2$
   (c) $5+6+3$ (d) $6+7+5$
   (e) None of these
4. If FLOWER is coded *GMPXFS*, then GARDEN is coded as
   (a) *HSBFEO* (b) *HBSEFO*
   (c) *ICTFGP* (d) *NEDRAG*
   (e) None of these
5. If BRANCH is coded *DTCPEJ*, then FIELD is coded as
   (a) *GJFME* (b) *HKGNF*
   (c) *JFMEG* (d) *FNGKH*
   (e) None of these
6. If SHOWER is coded *SFXPIT*, then GROUND is coded as
   (a) *ECVPSH* (b) *HSPVME*
   (c) *ITQWOF* (d) *FOWQTI*
   (e) None of these
7. If *BEAUTY* is coded as YVZFGB, then CHARM is coded as
   (a) *XSINZ* (b) *XSZIN*
   (c) *ZINSX* (d) *BGZQL*
   (e) None of these
8. If DIAMOND is coded *VQYMKLV*, then WEALTH is coded as
   (a) *EUYNFR* (b) *HTLAEW*
   (c) *YCCNWJ* (d) *XFBMUI*
   (e) None of these
9. If SHARP is coded 58034 and PUSH, 4658 then RUSH is coded as
   (a) 4658 (b) 3658 (c) 6583
   (d) 5846 (e) 8546
   If the MERCHANT is coded in five different ways using five different rules as
   (a) *UOBIDSFN* (b) *NFSDIBOU*
   (c) *OGTEJCPV* (d) *VPCJETGO*
   (e) *NVIXSZMG*

Find out the rules and which one of then has been applied in coding each of the following.

Words	*Code*	*Rules* (a) (b) (c) (d) (e)
10. LONDON	*OLMWLM*	... ...
11. VENICE	*FDJOFW*	... ...
12. PLEASURE	*QMFBTVSF*	... ...
13. EMOTION	*GOQVKQP*	... ...
14. ENJOY	*ZPKOF*	... ...
15. FRIEND	*FPGKTH*	... ...

16. If BEAT is written as *GIDV*, SOUP may be written as
   (a) *XSYR* (b) *XYXR* (c) *XSRX*
   (d) *XSXR* (e) *XYRS*
17. If MILD is written as *HEIB* then GATE may be written as

(a) *BQWC* (b) *BWQC* (c) *BQCW*
(d) *BCWQ* (e) *WQBC*

18. If POUR is written as *RSAZ*, WAKE may be written as
(a) *EYGT* (b) *TGEY* (c) *YEQM*
(d) *YGET* (e) *EGYT*

19. If COLD is written as *ALHY*, IRON may be written as
(a) *GUKI* (b) *GUSI* (c) *GOKI*
(d) *GKUI* (e) *GKOI*

Questions 20 to 37 are based on code language in such a way that in each question the capital letters in column I are written in a code in small letters in column II. However, the small letters are not arranged in the same order. Find out the small letter which stands for the bold capital letter in each question in column I.

	Column I	*Column II*
20.	PQRSI	(a) *k* (b) *t* (c) *m* (d) *h* (e) *h*
21.	BOARD	(a) *i* (b) *v* (c) *u* (d) *x* (e) *l*
22.	FVGHS	(a) *m* (b) *b* (c) *p* (d) *z* (e) *a*
23.	BGQUN	(a) *o* (b) *a* (c) *k* (d) *h* (e) *h*
24.	ANSTP	(a) *j* (b) *n* (c) *u* (d) *m* (e) *h*
25.	MLHVQ	(a) *f* (b) *b* (c) *g* (d) *p* (e) *k*
26.	JFMNE	(a) *y* (b) *b* (c) *h* (d) *z* (e) *g*
27.	THREA	(a) *y* (b) *l* (c) *u* (d) *b* (e) *n*
28.	XBHRN	(a) *r* (b) *h* (c) *l* (d) *b* (e) *v*
29.	STQRA	(a) *l* (b) *k* (c) *m* (d) *n* (e) *u*
30.	AERHM	(a) *y* (b) *u* (c) *l* (d) *b* (e) *g*
31.	MNEFQ	(a) *g* (b) *z* (c) *l* (d) *y* (e) *k*
32.	QVHLS	(a) *b* (b) *k* (c) *m* (d) *p* (e) *f*
33.	SHGVB	(a) *v* (b) *m* (c) *a* (d) *b* (e) *p*
34.	BXHRT	(a) *v* (b) *l* (c) *r* (d) *b* (e) *n*
35.	TPSNN	(a) *j* (b) *n* (c) *h* (d) *m* (e) *h*
36.	ANFRC	(a) *u* (b) *w* (c) *l* (d) *h* (e) *z*
37.	NSTPQ	(a) *k* (b) *h* (c) *j* (d) *n* (e) *m*

UNIT ELEVEN

Letter Number Series

BRIEF REVIEW OF CONCEPTS

The following questions are based on letter-cum-number series. The number series corresponds to the letter series or vice versa. Candidates are supposed to find the sequence of the letter series corresponding to the number series and mark out their answers from the choice given below.

OBJECTIVE EVALUATION

1. *aa—bba—abbb—aabb—b*
111—2—1—2——1—2—
(a) *abab* (b) *aabb* (c) *abbb*
(d) *aaab* (e) *abba*

2. *abb—bbb—ba—bbb—*
011—1110———10—
(a) *abbab* (b) *aabbb* (c) *ababb*
(d) *baabb* (e) *abbba*

3. *a—c—abbcc—aab—bc——*
1—1—23—1—2—3—
(a) *abccab* (b) *abccba* (c) *abbbcc*
(d) *ababcc* (e) *baabcc*

4. *aa—ba—b—aa—ba*
1—2—11—21—22—
(a) *bbaa* (b) *aabb* (c) *bbab*
(d) *babb* (e) *aaab*

5. *c—b—ccb—cba*
3—21—3—1—
(a) *accb* (b) *ccba* (c) *acbb*
(d) *ccaa* (e) *acbc*

6. 00110—0110—
a—bb—aa—b—a—
(a) *aaaba* (b) *ababc* (c) *aabaa*
(d) *aabaa* (e) *bbabb*

7. *x—z—y—vv—x—z—*
—2—6—56—5——5
(a)652262 (b) 622556 (c) 225656
(d) 656222 (e) 226556

8. *——010—0—0—001*
b—a—a—aba—a—b
(a) 10001 (b) 01001 (c) 10010
(d) 01010 (e) 00110

9. *—213—1—2—3—1*
s—d—pd——ds—d
(a) 32312 (b) 23132 (c) 13321
(d) 11232 (e) 22321

10. *—p—fs——f—pd—*
——21—3—14—2—
(a) 342312 (b) 434231 (c) 433421
(d) 233241 (e) 334421

11. *a—b——bb—a—bc*
—2—13—21—2—1
(a) 32132 (b) 22313 (c) 12231
(d) 32232 (e) 31223

12. *ab——a—c—a—cc*
—1—2—12—01—2
(a) 20021 (b) 12001 (c) 20012
(d) 02022 (e) 10201

13. *b——d—bc—bb—d*
—2—42—342—3—
(a) 24324 (b) 43224 (c) 23224
(d) 32342 (e) 32432

14. *—l—kl—x—mk—m*
—45—4—3—53—5
(a) 34534 (b) 35453 (c) 33544
(d) 44354 (e) 54435 (f) 35344

15. *a—b—a—bc—a—c*
—01—0—1—00—2
(a) 02021 (b) 20021 (c) 22001
(d) 00122 (e) 21021

16. *—v—u—wu—w—vw*
4—6—5—4—6—56
(a) 45454 (b) 45654 (c) 54655
(d) 54465 (e) 65454

17. *—qr—q—p—rp—r*
0—20—2—1—01—
(a) 12201 (b) 11022 (c) 01122
(d) 201201 (e) 11202

18. *—b—bb—b—cb—c*
1—0—10—10—1—
(a) 101101 (b) 11110 (c) 01011
(d) 10101 (e) 11011

19. *—np—n——npm—p*
—8—7—97—9—89
(a) 87978 (b) 89778 (c) 77897
(d) 79887 (e) 97878

20. *—m—l—n—mn—mn*
—12—2—3—13—1
(a) 31223 (b) 33122 (c) 12233
(d) 23312 (e) 13122

21. *—L—l—h—l—e—*
5—3—54—2—43—
(a) 23524 (b) 42352 (c) 35242
(d) 35242 (e) 24235

22. *r—t—s—rs——st*
—1—01—0—2—12
(a) 02210 (b) 22100 (c) 10022
(d) 02102 (e) 21020

23. *—cc—b—cd—c—d*
2——42—342—3—
(a) 22423 (b) 43223 (c) 33334
(d) 33432 (e) 24233

24. *—bc—a—ca—ab—*
3—11—2—11—2—
(a) 13132 (b) 13231 (c) 21313
(d) 33121 (e)12113.

25. *—c—db—cd—cc—*
0—1—01—20—1—
(a) 21101 (b) 22112 (c) 12112
(d) 10021 (e) 21102

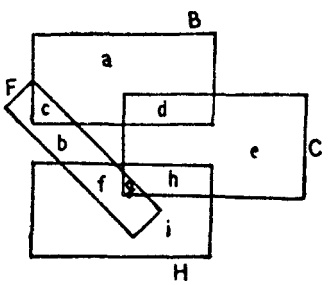
UNIT TWELVE

Problems on Venn Diagrams

BRIEF REVIEW OF CONCEPTS

This section consists of questions based on Venn diagrams. Say, for example, there are four rectangles, B, C, H, F, where rectangle B stands for persons who like badminton, C for those who like cricket, H for those who like hockey, and F for those who like football. Different regions of the rectangles are indicated by a, b, c, d, etc.

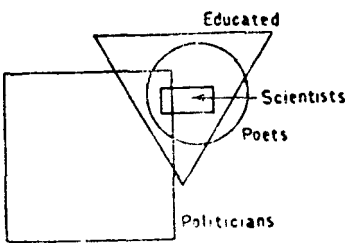
OBJECTIVE EVALUATION



Study the above diagram carefully and answer the following questions from the choice given below.

1. Number of persons who play badminton and football but not cricket.
   (a) d (b) b (c) a
   (d) c (e) f
2. Persons who play football, hockey and cricket but not badminton.
   (a) f (b) i (c) g
   (d) h (e) d
3. Persons who play neither hockey nor cricket but play football and badminton.
   (a) f (b) b (c) d
   (d) c (e) h
4. Persons who play only football.
   (a) f (b) b (c) c
   (d) F (e) None of these
5. Persons who play cricket, badminton and hockey but not football.
   (a) d (b) e (c) f
   (d) g (e) None of these
6. Persons who play hockey, badminton and football but not cricket.
   (a) a (b) b (c) c
   (d) d (e) None of these
7. Persons who play neither football nor badminton but only cricket and hockey.
   (a) f (b) i (c) h
   (d) d (e) e
8. Persons who play all four games.
   (a) j (b) h (c) b
   (d) All the above
   (e) None of these
9. Persons who play any three games.
   (a) i (b) h (c) b
   (d) g (e) None of these
10. Persons who play any one game.
    (a) a, b, c, d (b) a, e, b, f
    (c) b, a, e, i (d) i, a, e, h
    (e) None of these

Study the following diagram carefully. The triangle represents educated people, the rectangle, scientists, the circle, poets and the square, politicians.



Choose the correct answer from the choice given in each question.

11. In the above diagram, which one of the following statements is **not** true ?
    (a) All politicians are educated.
    (b) Some politicians are poets but not scientists.

(c) Some poets are educated but not politicians.
(d) Some scientists are politicians.
(e) All scientists are educated.

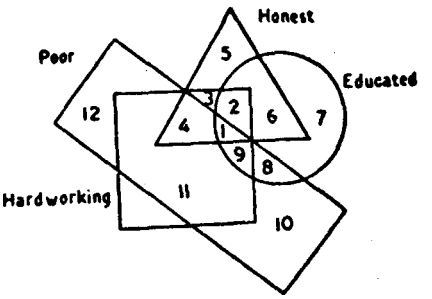
12. In the above diagram, which one of the following is true ?
(a) All poets are scientists.
(b) Some politicians are educated but they are neither poets nor scientists.
(c) Some scientists are politicians but not educated.
(d) Some poets are not educated but they are politicians.
(e) None of these.

13. In the above diagram, which one of the following statements is true ?
(a) A few politicians are educated and are poets as well.
(b) Educated politicians are all scientists.
(c) Every educated person is either a poet, scientist or politician.
(d) All poets are educated.
(e) None of these.

14. In the above diagram, which one is **not** correct ?
(a) Some scientists are politicians and poets also.
(b) Some poets are neither educated nor politicians nor scientists.
(c) All scientists are poets but not politicians.
(d) Educated people are either politicians, poets or scientists.
(e) None of the above.

15. In the above diagram, which one of the following statements true ?
(a) Some scientists are either politicians or poets.
(b) All educated politicians are poets.
(c) Uneducated people are either poets or politicians.
(d) Some politicians are educated and scientists, but not poets.
(e) None of these.

Study the following diagram carefully and answer the following questions from the choice given below.



In this diagram, the rectangle stands for poor, the square for hardworking, the triangle for honest and the circle for educated.

16. People who are neither educated nor poor but honest.
(a) 3 (b) 4 (c) 5
(d) 10 (e) None of these

17. People who are neither hardworking nor educated but honest.
(a) 2 (b) 5 (c) 6
(d) 7 (e) 8

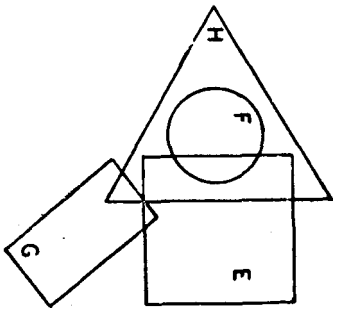
18. People who are honest as well as hardworking and educated but not poor.
(a) 1 (b) 2 (c) 3
(d) 4 (e) 6

19. People who are hardworking and honest but are neither educated nor poor.
(a) 2 (b) 3 (c) 4
(d) 5 (e) 6

20. People who are poor, hardworking, educated and honest.
(a) 1 (b) 2 (c) 3
(d) 4 (e) 9

21. People who are poor, hardworking and educated.
(a) 7 (b) 8 (c) 9
(d) 10 (e) 11

In the following diagram, the triangle stands for Hindi-speaking people, circle for French-speaking, square for English-speaking and rectangle for German-speaking. Study the diagram carefully and answer the following questions.



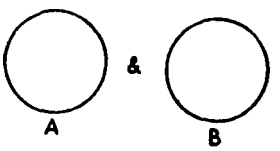
22. In the above diagram, which one of the following statement is true ?
    (a) All French-speaking people speak Hindi also.
    (b) All German-speaking people speak English and Hindi.
    (c) All French-speaking people speak English.
    (d) None of these.
23. In the diagram, which one of the following statements is true ?
    (a) There are some people who speak all four languages.
    (b) All Hindi-speaking people speak French but not German.
    (c) Some German-speaking people can speak either Hindi or English.
    (d) Some English speaking people cannot speak all the languages.
    (e) None of these.
24. In the above diagram, which one of the following is not true ?
    (a) Some french speaking people can speak Hindi and English but not German.
    (b) Some Hindi speaking people can speak french, English and German as well.
    (c) No french speaking people can speak German.
    (d) German speaking people cannot speak French.
    (e) None of these.
25. In the above diagram, state which one of the following is true.
    (a) Those who speak, English can speak German and French as well.
    (b) All French speaking people can speak Hindi.
    (c) Only French speaking people can speak Hindi and English.
    (d) German speaking people cannot speak all the languages.
    (e) None of these.

UNIT THIRTEEN

Logical Diagrams

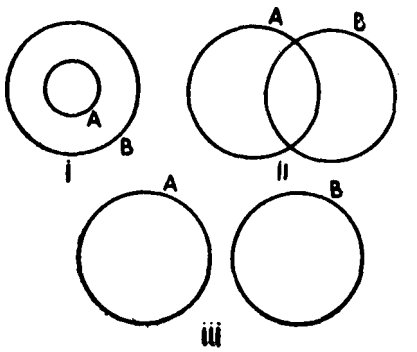
BRIEF REVIEW OF CONCEPTS

In this chapter we will study how diagrams can represent the relationship between two or



three classes. Suppose the two classes A and B be represented by two circles
The size of the circle has nothing to do with the class. The three possible relationships between any two classes, say A and B, can be represented by the following diagrams

1. The first relation illustrates one class completely contained in the other but the other is not contained in the first, i.e. A is contained in B, but B is not contained in A.

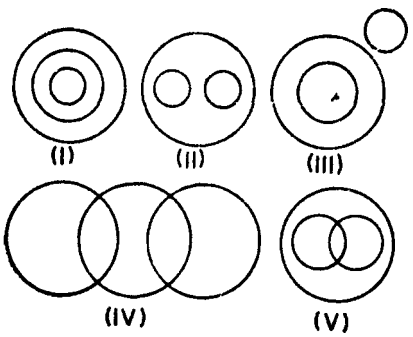


2. The second relation illustrates that neither class is completely contained in the other, however they have something or some members in common. Here A and B have a part in common.

3. The third relation illustrates that there is nothing in common. Here A and B are completely different from each other. (The size of the circle has nothing to do with the class.)

Now let us apply these concepts in the following examples.

The following questions are based on five diagrams representing the relationship between the three classes given below. Candidates are required to choose one of the following diagrams which represents the possible relationship between the classes given in the question.



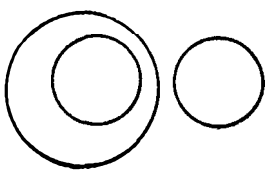
There are five sets of figures and each circle in a figure represents one class.

● Which of the above diagrams illustrates the relationship between

Animals Men Plants

Here the three objects, namely animals, men and plants, refer to three different classes and each of them is represented by a circle.

All men are animals but all animals are not men, i.e. one class is contained in the other but the other is not contained in the first.

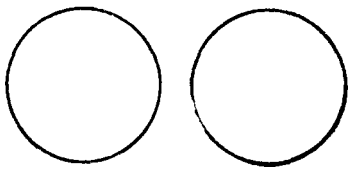


Now plants and animals have nothing in common. Hence we can say that all men are animals but plants have nothing in common with them. This can be represented by the following figure.

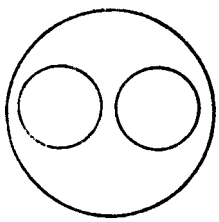
● Which of the above diagrams illustrates the relation between

Wood Bricks Houses

Wood, bricks and houses are of three classes. Wood and bricks are quite different from each other and hence can be illustrated by two separate circles.

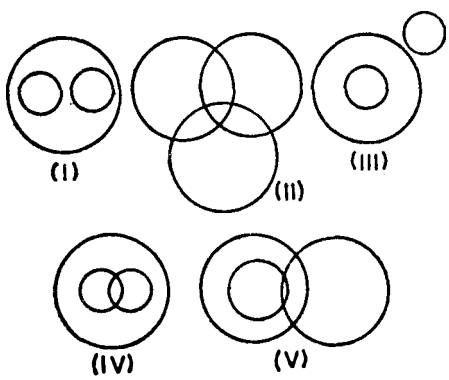


Both wood and bricks are used in building houses. Hence, they are contained in class (ii).



OBJECTIVE EVALUATION

In this section there are five diagrams.

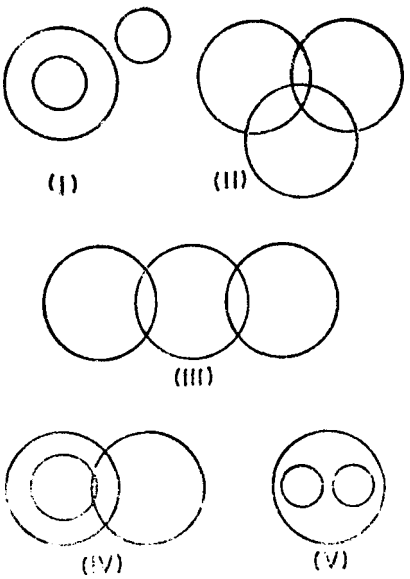


Choose one diagram that illustrates the possible relationship between the three classes in each of the cases given below.

1.	Americans	Scientists	People
2.	Birds	Sparrows	Dogs
3.	Grown ups	Men	Players
4.	Artists	Painters	Cricket fans
5.	Fish	Mosquitoes	Insects
6.	Grey hair	Men	Lawyers
7.	Lions	Animals	Roses

Questions 8 – 15 are based on the following diagrams.

8.	Nephews	Uncle	Relative
9.	Boeing 747	Helicopters	Airplanes
10.	Actors	Musicians	Father
11.	Books	Newspapers	Printed matter
12.	Boys	Hard working	Playful
13.	French	European	Scientists
14.	Indian	Asian	Actors
15.	Musician	Scientist	Artist
16.	Hockey	Games	Cricket
17.	Students	Girls	Boys



18.	Movie stars	Artist	Americans
19.	Ladies	Lawyers	Dancers
20.	Wise	Men	Duffer

UNIT FOURTEEN

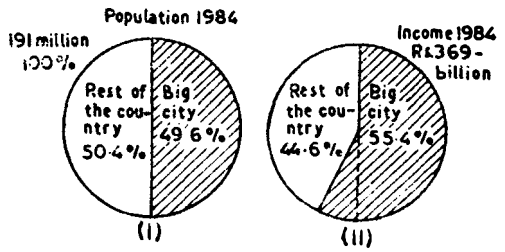
Graphic Interpretations

BRIEF REVIEW OF CONCEPTS

With reference to the following graph, find the correct answer from the choice given below.

Population 1984
191 million = 100%

Income 1984
Rs 369 billion



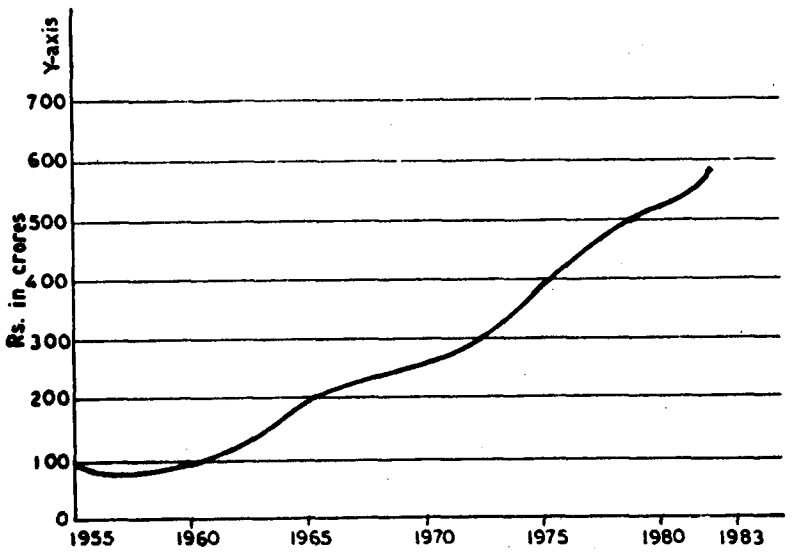
1. On a per capita basis the average income of a big city resident is approximately
   (a) Rs 2,000 (b) Rs 2,150
   (c) Rs 2,400 (d) Rs 2,700
   (e) Rs 2,950
2. On a per capita basis the average income for people living in the rest of the country was approximately
   (a) Rs 1,000 (b) Rs 1,200
   (c) Rs 1,400 (d) Rs 1,700
   (e) Rs 2,000
3. By what percentage was the per capita income of big city residents greater than that of people living in the rest of the country?

(a) 32.5 (b) 35.0 (c) 38.4
(d) 31.3 (e) 26.5

4. Approximately how many degrees are there in the central angle of the sector of the income circle for big city income?
(a) 185 (b) 190 (c) 195
(d) 200 (e) 205

5. What is the approximate ratio of big city income to the rest of the country?
(a) 5:4 (b) 7:5 (c) 4:3
(d) 3:2 (e) 8:5

With reference of the graph find out the correct answer from the choice given below.



India's Gross National Product

6. What is the approximate ratio of GNP in 1980 to that in 1960?
(a) 5:1 (b) 5:2 (c) 6:1
(d) 7:1 (e) 7:2

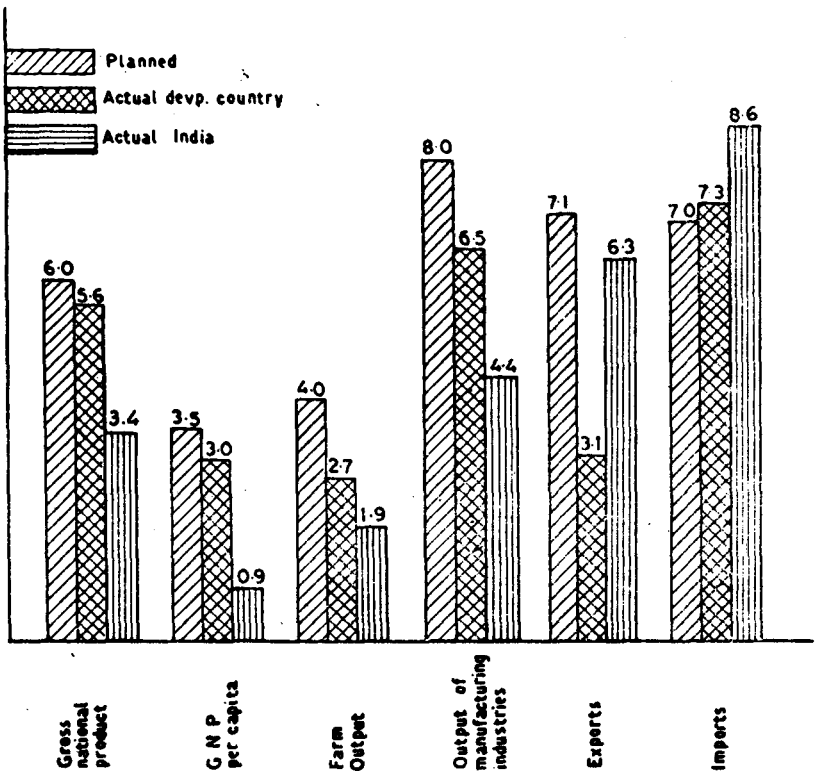
7. The minimum increase in GNP occurred in the five-year period commencing
(a) 1975 (b) 1970 (c) 1965
(d) 1960 (e) 1955

8. The greatest increase in GNP occurred in the five-year period commencing
(a) 1975 (b) 1970 (c) 1965
(d) 1960 (e) 1955

9. The percentage increase in GNP from 1960 to 1980 is
(a) 5.85 (b) 4.85 (c) 3.85
(d) 4.85 (e) 58.5

10. The percentage increase in GNP from 1980 to 1983 is
(a) 30 (b) 40 (c) 65
(d) 85 (e) 17

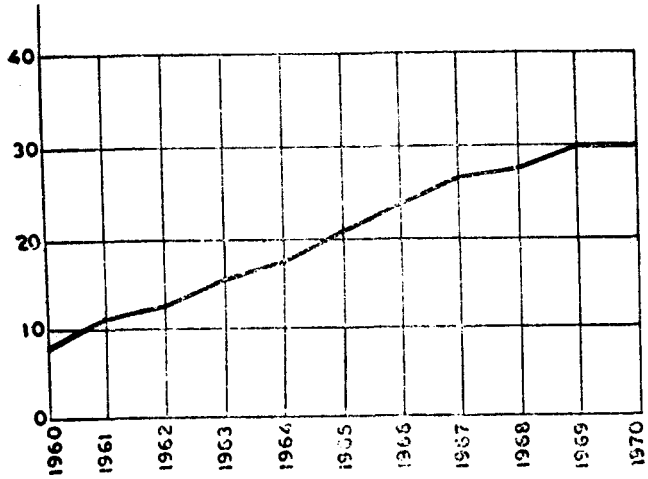
Development Strategy for Developing Countries U.N. Second Development Decade (1971 - 80)



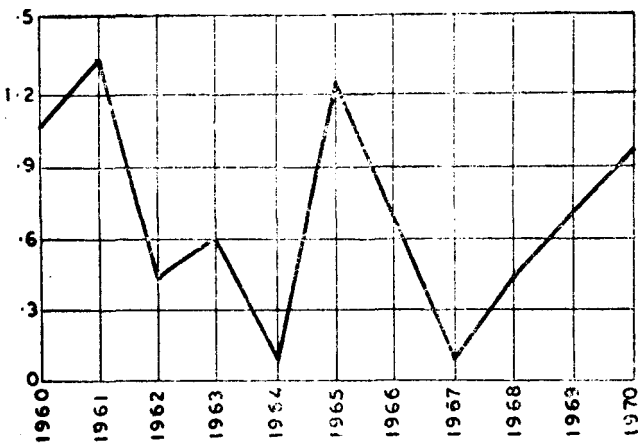
The following questions are based on the above graph. Study the graph carefully and answer each question from the choice given below.

11. Which of the following has recorded the highest growth rate in actual in India during 1971-80?
    (a) GNP (b) GNP per capita
    (c) Exports (d) Imports
    (e) Output of manufacturing industries
12. Which of the following has recorded the lowest rate in developing countries during 1971-80?
    (a) GNP per capita (b) Farm output
    (c) Exports (d) All of these
    (e) None of these
13. Growth rate of India's GNP per capita has been ... of the actual developing countries.
    (a) 35% (b) 65% (c) 20%
    (d) 30% (e) 25%
14. India's farm output during 1971-80 has been recorded as being
    (a) more than 70% of the target
    (b) more than 70% of the actual developing countries
    (c) equivalent to the rate of GNP
    (d) less than GNP per capita
    (e) none of these
15. The output of manufacturing industries in India during 1971-80 was
    (a) 67.6% less than the target
    (b) just 67.6% of the target
    (c) 67.6% more than the target
    (d) 55% of the target
    (e) 55% more than the target

Indian Plane Crashes



Total Passenger miles millions



Death per 100 passenger miles

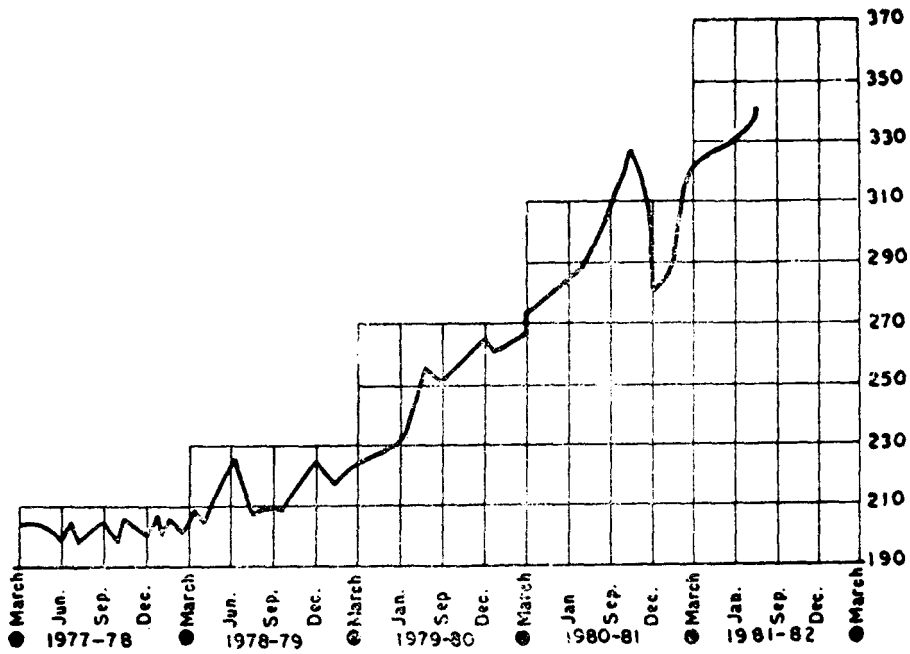
16. The period with the smallest increase in total passenger miles was
(a) 1961-62 (b) 1964-65
(c) 1965-66 (d) 1967-68
(e) 1968-69

17. Which of the following is not true.
(a) 30 million passenger miles were flown in 1969.
(b) There has been an increase in passenger-deaths every year.
(c) There has been an inctease in passenger-miles flown from 1961-to 1967.
(d) There were less passenger deaths in 1970 than 1960.
(e) There were deaths for every 100 million passenger-miles.

18. In 1965 passenger-deaths were approximately
(a) 24 (b) 240 (c) 2400
(d) 24,000 (e) 240,000

19. The sharpest drop in passenger deaths was during
(a) 1961-1962 (b) 1963-1964
(c) 1965-1966 (d) 1964-1965
(e) 1967-1970

20. The least number of passenger deaths occurred during
(a) 1960 - 1967 (b) 1954-1960
(c) 1962-1965 (d) 1963 and 1955
(e) 964 and 1967



Retail price index for Greater Bombay (1969-70=100)

21. The nature of the graph shows
    (a) a regular increase in price
    (b) that the price index increases at an average rate throughout
    (c) a sharp rise in price index during 1980-81
    (d) the rise in price during Sept-Dec during 1980-81 was beyond control
    (e) none of these.

22. Which one of the following is **not** true?
    (a) The price index during 1980-81 shows the highest rate of inflation.
    (b) The rate of inflation was almost nil during 1977-78.
    (c) The rate of increase has been maximum during 1980-81.
    (d) Overall inflation during 1980-81 was nil.
    (e) None of these.

23. Which of the following periods has recorded the maximum rise in price?
    (a) June-Sept 1979-80
    (b) June-Sept 1980-81
    (c) Dec March 1979-81
    (d) Sept-Dec 1980-81
    (e) None of these

24. Which one of the following has been the most favourable for consumers?
    (a) 1977-78 (b) 1978-79
    (c) 1979-80 (d) 1980-81
    (e) 1981-82

25. Which of the following periods has been the most favourable for hoarders?
    (a) March-Sept 1979-80
    (b) March-Dec 1980-81
    (c) Sept-Dec 1980-81
    (d) Dec-March 1980-81
    (e) None of these

UNIT FIFTEEN
Analogy Test

BRIEF REVIEW OF CONCEPTS

In the following questions the two capitalized words have a certain relationship with each other. Following the capitalized words are other pairs of words. Candidates are required to select a pair of words from the choice given below.

● CLOTH: TEXTURE : : ...
(a) wool : silk (b) wood : grain
(c) book : text (d) linen : flax
(e) paper : weight

The answer is (b) wood:grain

● JAIL:CRIME: : ...
(a) judge:criminal
(b) freedom:bird
(c) prism:thief
(d) cemetery:death
(e) victim:intruder

The answer is (d). cemetery:death, because crime usually lands a person in jail and death usually lands a person in a cemetery.

OBJECTIVE EVALUATION

1. MUMBLE:TALK : : ...
(a) orate:speak (b) scrawl:write
(c) bumble:buzz (d) yell:shout
(e) mumbo:jumbo

2. SMILE:AMUSEMENT : : ...
(a) jell:game (b) guffaw:laughter
(c) yawn: ennui (d) wink:vulgarity
(e) cry:havoc

3. PLANTS:COAL : : ...
(a) water:fish (b) air:gas
(c) animals :oil (d) rocks:heat
(e) alcohol:burn

4. MINK:LION : : ...
(a) chicken:wolf (b) tiger:zebra
(c) farm:zoo (d) lady:gentleman
(e) timidity:daring

5. BLOW : HORN : : ...
(a) switch : tracks
(b) turn on : lights
(c) go over : map
(d) accelerate : engine
(e) tune : radio

6. MODESTY : ARROGANCE : : ...
(a) debility : strength
(b) cause : purpose
(c) passion : emotion
(d) finance : Wall street
(e) practice : perfection

7. THREAT : INSECURITY : : ...
(a) challenge : fight
(b) reason : anger
(c) thunder : lightning
(d) speed : acceleration
(e) discipline : learning

8. LARGE : ENORMOUS : : ...
(a) cat : tiger
(b) warmth : frost
(c) plump : fat
(d) royal : regal
(e) happy : solemn

9. LAWYER : CLIENT : : ...
(a) student : pupil
(b) mechanic : automobile
(c) doctor : patient
(d) stenographer : letter
(e) accountant : book

10. DUNE : SAND : : ...
(a) hill : beach
(b) wind : grain
(c) salt : air
(d) glazier : glass
(e) glacier : snow

11. CROWN : ROYAL : : ...
(a) helmet : military
(b) cola : sweet
(c) crucifix : religion
(d) wrap : ermine
(e) throne : regal

12. WOOD : MILK : : ...
(a) tree : pasture
(b) nature : industry
(c) cord : industry
(d) leaf : cow
(e) wagon : pail

13. ISLAND : OCEAN : : ...
(a) hill : stream
(b) forest : valley
(c) oasis : desert
(d) tree : field
(e) flower : seed

UNIT SIXTEEN

Sets of Numbers

BRIEF REVIEW OF CONCEPTS

In this chapter, the questions are based on sets of numbers. The numbers in a given set are in a certain sequence. Candidates are required to find out the alternative set, from the choice, which is most similar to the set given in the question.

● **Type I** The given set is (3, 5, 9)
(a) (2, 3, 4) (b) (1, 3, 5)
(c) (3, 4, 5) (d) (4, 5, 6)
(e) (5, 6, 7)

Obviously, the answer is (b) because both sets are sets of odd numbers. Other sets do not have the same relation.

● **Type II** The given set is (9, 13, 18)
(a) (8, 12, 17) (b) (6, 10, 17)
(c) (5, 7, 11) (d) (3, 7, 13)
(e) (4, 8, 12)

The relation between numbers in the given set is, $9+4=13$, $13+5=18$. The same relation exists between numbers of the set (8, 12, 17), i.e. $8+4=12$ and $12+5=17$. Hence, the answer is (a).

● **Type III** The given set is (3, 6, 12)
(a) (2, 4, 8) (b) (3, 9, 18)
(c) (5, 18, 30) (d) (2, 6, 12)
(e) (1, 9, 25)

The relation between numbers in the given set is, $3\times2=6$ and $6\times2=12$. The same relation exists between numbers of set (a), i.e. $2\times2=4$ and $4\times2=8$. Therefore, the answer is (a).

● **Type IV** The given set is (1, 9, 25)
(a) (3, 5, 11) (b) (5, 7, 13)
(c) (1, 4, 17) (d) (9, 16, 25)
(e) (4, 9, 14)

The answer is (d) because both the sets (1, 9, 25) and (9, 16, 25) are sets of square numbers. Other sets do not have this relation.

● **Type V** The given set is (3, 8, 15).
(a) (8, 13, 18) (b) (4, 9, 18)
(c) (3, 7, 11) (d) (8, 15, 24)
(e) (5, 8, 13)

The numbers in the given set are one less than the square of the numbers 2, 3 and 4, like $2^2-1=3$, $3^2-1=8$ and $4^2-1=15$. Set (d) i.e. (8, 15, 24), has the same relation. The answer is therefore (d).

Type VI The given set is (12, 20, 4).
(a) (13, 18, 5) (b) (5, 10, 5)
(c) (17, 27, 5) (d) (20, 15, 25)
(e) (21, 17, 28)

The numbers in the given set are such that if 8 is added to the first number 12 we get the second number 20. Half of the number which is added gives us the third number 4, i.e. $12+8=20$ and $8\div2=4$. The same relation exists between the numbers of set (c), i.e. $17+10=27$ and $10\div2=5$. Therefore the answer is (c).

● **Type VII** The given set is (5, 6, 11)
(a) (8, 9, 18) (b) (7, 8, 15)
(c) (6, 5, 12) (d) (3, 4, 15)
(e) (6, 7, 14).

The third number in the given set is the sum of the first two, i.e. $5+6=11$. The same relation exists in set (b), i.e. $7+8=15$. Hence the answer is (b).

OBJECTIVE EVALUATION

The following questions are based on sets of numbers. The numbers in a given set are in a certain order or logic. Candidates are required to find out the alternative set from the choice which is most like the set given in the question.

1. The given set is (1, 3, 7)
(a) (1, 4, 9) (b) (2, 5, 9)
(c) (2, 5, 7) (d) (5, 10, 12)
(e) (3, 8, 16)

2. The given set is (3, 7, 11)
(a) (2, 5, 9) (b) (3, 5, 14)
(c) (7, 11, 14) (d) (4, 8, 13)
(e) (5, 9, 17)

3. The given set is (5, 15, 20)
(a) (4, 9, 13) (b) (2, 6, 12)
(c) (5, 10, 15) (d) (3, 9, 12)
(e) (7, 21, 27)

4. The given set is (5, 9, 14)
(a) (3, 8, 13) (b) (5, 10, 14)
(c) (6, 10, 16) (d) (4, 8, 13)
(e) (7, 12, 18)

5. The given set is (7, 11, 16)
(a) (4, 7, 13) (b) (5, 9, 14)
(c) (6, 9, 16) (d) (11, 17, 21)
(e) (13, 18, 24)

6. The given set is (3, 8, 13)
(a) (2, 3, 4) (b) (4, 6, 11)
(c) (3, 5, 9) (d) (7, 9, 17)
(e) (5, 4, 9)

7. The given set is (4, 12, 24)
(a) (5, 10, 15) (b) (6, 18,36)
(c) (7, 21, 28) (d) (2, 6, 18)
(e) (3, 15, 30)

8. The given set is (2, 8, 10)
(a) (3, 5, 8) (b) (6, 7, 15)
(c) (4, 8, 16) (d) (3, 9, 11)
(e) (3, 12, 14)

9. The given set is (2, 5, 15)
(a) (7, 10, 13) (b) (3, 8, 24)
(c) (4, 5, 9) (d) (5, 8, 15)
(e) (3, 6, 18)

10. The given set is (1, 4, 25)
(a) (3, 9, 16) (b) (1, 8, 24)
(c) (5, 10, 15) (d) (9, 16, 17)
(e) (1, 9, 16)

11. The given set is (4, 16, 36)
(a) (9, 16, 25) (b) (4, 9, 16)
(c) (9, 25, 49) (d) (9, 16, 49)
(e) (4, 9, 25)

12. The given set is (8, 15, 24)
(a) (8, 13, 18) (b) (7, 12, 15)
(c) (5, 10, 15) (d) (3, 8, 12)
(e) (15, 24, 35)

13. The given set is (10, 17, 26)
(a) (7, 14, 23) (b) (5, 10, 17)
(c) (3, 6, 10) (d) (4, 9, 12)
(e) (2, 5, 9)

14. The given set is (14, 20, 3)
(a) (7, 13, 3) (b) 8, 5, 13)
(c) (5, 10, 15) (d) (3, 6, 9)
(e) (4, 8, 16)

15. The given set is (17, 25, 16)
(a) (10, 17, 24) (b) (7, 16, 6)
(c) (3, 9, 4) (d) (5, 9, 8)
(e) (3, 6, 10)

16. The given set is (17, 26, 37)
(a) (5, 10, 17) (b) (10, 17, 24)
(c) (3, 7, 11) (d) (5, 10, 26)
(e) (11, 18, 27)

17. The given set is (11, 18, 17)
(a) (5, 10, 17) (b) (17, 26, 37)
(c) (10, 17, 27) (d) (7, 11, 19)
(e) (6, 11, 18)

18. The given set is (8, 14 48)
(a) (7, 15, 54) (b) (6, 12, 30)
(c) (5, 19, 24) (d) (5, 9, 20)
(e) (3, 8, 16)

19. The given set is (4, 9, 15)
(a) (5, 11, 17) (b) (4, 7, 13)
(c) (3, 8, 19) (d) (4, 11, 15)
(e) (5, 11, 18)

20. The given set is (0, 8, 24)
(a) (0, 7, 10) (b) (3, 8, 15)
(c) (14, 23, 32) (d) (23, 33, 46)
(e) (13, 39 51)

UNIT SEVENTEEN

Spatial Ability

BRIEF REVIEW OF CONCEPTS

The questions in this unit are based on the pyramid of numbers from 1 to 100, as given below.

								1										
							2	3	4									
						9	8	7	6	5								
					10	11	12	13	14	15	16							
				25	24	23	22	21	20	19	18	17						
			26	27	28	29	30	31	32	33	34	35	36					
		49	48	47	46	45	44	43	42	41	40	39	38	37				
	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64			
81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65		
82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

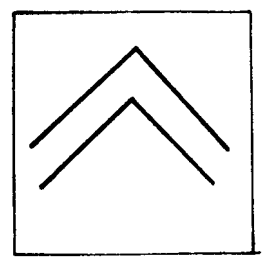
Many types of questions are possible based on the above pattern for instance, formation of parallel lines, perpendicular lines, triangles, squares, etc., by taking numbers in order.

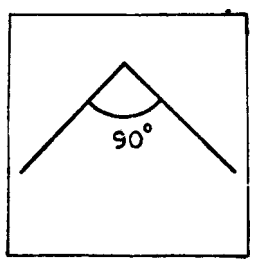
● **Type I** Fill the blanks from the choice given below.

129 : 145 : : 3 11 : ?

(a) 3713 (b) 328 (c) 346
(d) 3614 (e) 3615

There are two groups of numbers. The numbers on the right-hand side must have the same relation as the numbers on the left-hand side. 129 and 145, in the above pyramid, form a pattern.





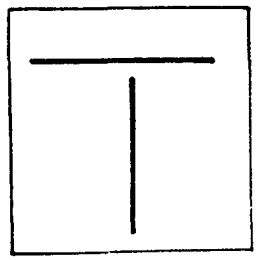
Hence, the number in the blank on the right-hand side must form the same pattern with 3811. Therefore, the answer is 3615 which forms the pattern

● **Type II** Fill the blank from the choice given below.

2812 : 765 : : 91123 : ?

(a) 121110 (b) 121314
(c) 122132 (d) 303132
(e) 122230

The two numbers on the left-hand side form perpendicular lines in the pyramid. Therefore, the numbers on the right-hand side must be of the same pattern. The answer to the above question should be
(b) 121314 to satisfy the same relation.

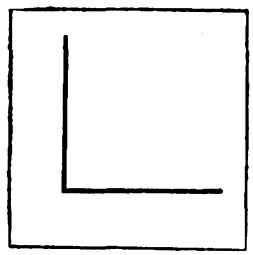


● **Type III** Fill the blank from the choice given below.

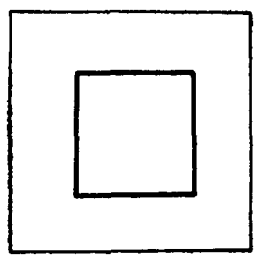
234 : 4614 : : 2812 : ?

(a) 3713 (b) 34614 (c) 121314
(d) 131415 (e) 122239

The numbers on the left-hand side form two sides of a square. The numbers have



been chosen in continuity. 2812 and 121314 are in continuity and form the other two sides of the same square. Hence the answer is (c).

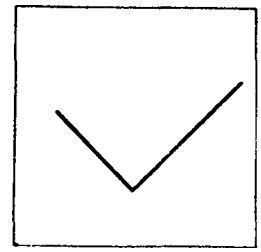


● **Type IV** Fill the blank from the choice given below.

507986 : 775445 : : 537689 :

(a) 745742 (b) 735841
(c) 716039 (d) 755643
(e) 775543

Hence two numbers on the left-hand side form perpendicular lines. Therefore, the numbers on the right-hand side must form the same point, taking numbers in order. Hence the answer is (a) 745742.



● **Type V** Fill the blank from the choice given below.

322120 : 321920 : : 324342 : ?

(a) 324142 (b) 324132 (c) 323143
(d) 323319 (e) 324133

The numbers on the left-hand side form a triangle. Therefore, the numbers on the right-hand side must form a triangle with the common point 32. Hence, the answer is (a) 324142.

OBJECTIVE EVALUATION

Fill the blanks in the following questions from the choice given below.

1. 192021 : 213241 : : 414243 : ?
   (a) 433023 (b) 435871 (c) 414039
   (d) 435773 (e) 433121
2. 494852 : 818084 : : 101123 : ?
   (a) 121321 (b) 494852 (c) 9812
   (d) 252428 (e) 262747
3. 432946 : 443241 : : ? : 706267
   (a) 725675 (b) 695972 (c) 705873
   (d) 696366 (e) 715774
4. 171210 : 31311 : : 19415856 : ?
   (a) 335957 (b) 333342 (c) 333460
   (d) 325961 (e) 194139
5. 151933 : 425774 : : 132131 : ?
   (a) 435675 (b) 445576 (c) 455477
   (d) 304554 (e) 324356
6. 3812 : 3614 : : 284753 : ?
   (a) 284654 (b) 282930 (c) 294456
   (d) 304357 (e) 284555
7. 151835 : 193439 : : 274655 : ?
   (a) 274656 (b) 465574 (c) 475475
   (d) 455673 (e) 264754
8. 324356 : 324160 : : 425774 : ?
   (a) 425970 (b) 425971 (c) 423122
   (d) 322112 (e) 423318

9. 474849 : 495277 : : 777879 : ?
   (a) 795149 (b) 795247 (c) 527978
   (d) 525377 (e) 787952
10. 56443022 : 131415 : : 18344060 :
   (a) 604132 (b) 595857 (c) 717273
   (d) 606162 (e) 603936
11. 252845 : 274655 : : 264754 : ?
   (a) 102330 (b) 495277 (c) 485376
   (d) 262510 (e) 485180
12. 767574 : 564430 : : 899091 : ?
   (a) 929394 (b) 917357 (c) 574331
   (d) 765446 (e) 735743

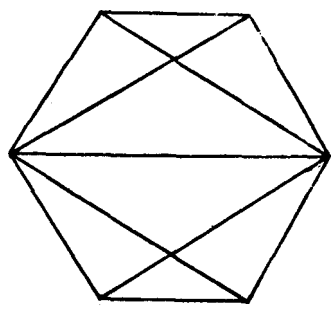
UNIT EIGHTEEN

Geometrical Diagrams

BRIEF REVIEW OF CONCEPTS

In this unit, questions are based on geometrical figures. From a complex geometrical pattern, one is required to find out the number of triangles, quadrilaterals, parallelograms, pentagons, hexagons, etc.

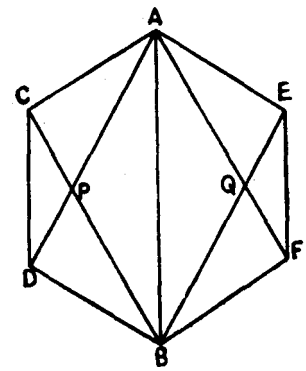
• Find the number of triangles in the following figure.



(a) 12 (b) 14 (c) 16
(d) 18 (e) 20

The answer is (c) 16 because, if we analyse the figure in fragments, the whole hexagon is divided into eight triangles, apparently. However, if we have the points of intersection, we can find the total number of triangles in the figure.

Two triangles are formed on *AB* on its right side, i.e. $\triangle AFB$ and $\triangle AEB$. Two are formed on *EF*, i.e. $\triangle BEF$ and $\triangle AEF$. Similarly, two triangles on *AB* towards its left side are *ABD* and *ABC*. Two triangles are based on *CD* itself, i.e. *ACD* and *CBD*. Hence, the total number of triangles in the above figure is 16.



• Find the quadrilaterals in the above figure.

(a) 6 (b) 7 (c) 8
(d) 9 (e) 10

The answer is (d) 9. Analysis of the figure can be made in the following way :

ABFE, *ACDB*, *APBQ*, *APBF*, *APBE*, *ACBQ*, *ADBQ*, *ACBE* and *ADBF*.

• Find the number of pentagons in the above figure.

(a) 3 (b) 4 (c) 5
(d) 6 (e) 7

The answer is (d) 6, namely *ADBFE*, *ACDBF*, *CBFEA*, *BEACD*, *APBFE* and *AQBDC*.

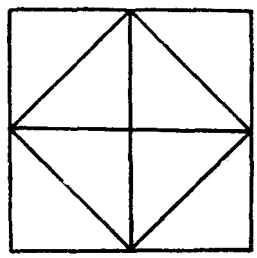
• Find the total number of hexagons in the above figure.

(a) 0 (b) 1 (c) 2
(d) 3 (e) 4

The answer is (b) 1 namely *ACDBFE*.

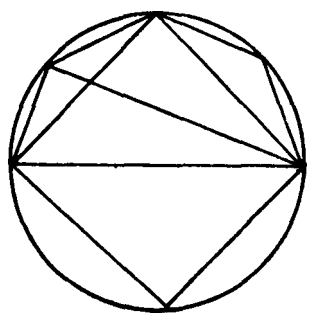
OBJECTIVE EVALUATION

The following questions are based on geometrical figures. Study the following pattern carefully and answer the questions given below.

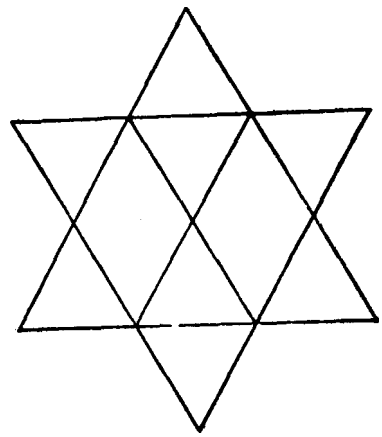


1. The number of triangles in the above figure is
   (a) 8 (b) 10 (c) 12
   (d) 14 (e) 16
2. The number of quadrilateral in the above figure is
   (a) 8 (b) 9 (c) 10
   (d) 11 (e) 12
3. The number of pentagons in the above figure is
   (a) 6 (b) 8 (c) 10
   (d) 12 (e) 14
4. The number of hexagons in the above figure is
   (a) 0 (b) 1 (c) 2
   (d) 3 (e) 4

Study the following diagrams carefully and answer the questions below.



5. The number of triangles in the above diagram is
   (a) 8 (b) 10 (c) 12
   (d) 14 (e) 16
6. The number of quadrilaterals in the above figure is
   (a) 3 (b) 4 (c) 5
   (d) 6 (e) 7
7. The number of pentagons in the above diagram is
   (a) 0 (b) 1 (c) 2
   (d) 3 (e) 4
8. The number of hexagons in the above diagram is
   (a) 0 (b) 1 (c) 2
   (d) 3 (e) 4
9. The number of triangles in the figure above is
   (a) 10 (b) 12 (c) 14
   (d) 16 (e) 18



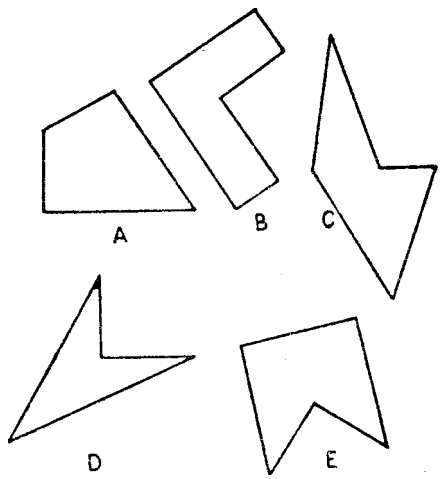
10. The number of parallelograms in the above figure is
    (a) 6 (b) 7 (c) 8
    (d) 9 (e) 10
11. The number of the quadrilaterals in the above figure is
    (a) 22 (b) 24 (c) 26
    (d) 28 (e) 30
12. The number of pentagons in the above figure is
    (a) 3 (b) 4 (c) 5
    (d) 6 (e) 7
13. The number of hexagons in the above figure is
    (a) 0 (b) 1 (c) 2
    (d) 3 (e) 4

UNIT NINETEEN

Identification of Geometrical Patterns

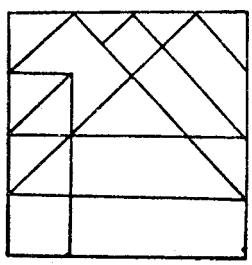
BRIEF REVIEW OF CONCEPTS

This unit is based on the figure pattern. This is designed to know your aptitude for finding similarities or resemblances between two given patterns.

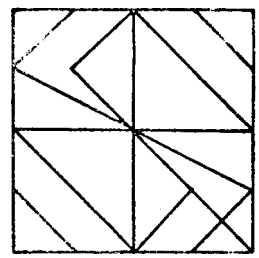


Study the above figures carefully and note the construction of each, i.e. how many right angles are there in the given quadrilateral, pentagon or hexagon, and hence compare them with the given pattern. It is important to mark whether the two right angles are adjacent or opposite to each other.

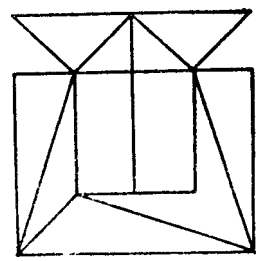
OBJECTIVE EVALUATION



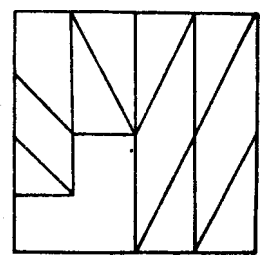
1. Which of the following figures is contained in above pattern ?
   (a) Fig. A (b) Fig. B (c) Fig. C
   (d) Fig. D (e) Fig. E



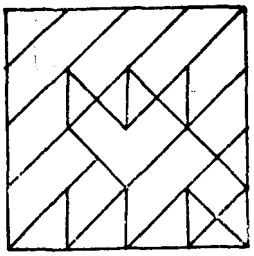
2. Which of the following figures is contained in the above pattern ?
   (a) Fig. A (b) Fig. B (c) Fig. C
   (d) Fig. D (e) Fig. E



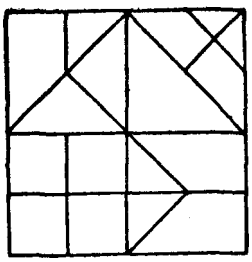
3. Which of the following figures is contained in the above pattern ?
   (a) Fig. A (b) Fig. B (c) Fig. C
   (d) Fig. D (e) Fig. E



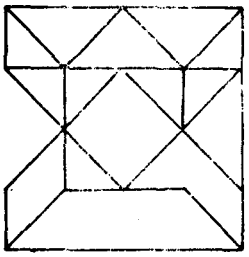
4. Which of the following figures is contained in the above pattern ?
(a) Fig. A (b) Fig. B (c) Fig. C
(d) Fig. D (e) Fig. E



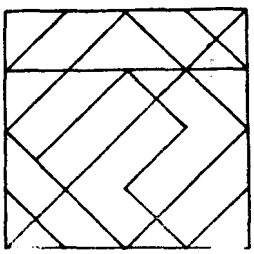
5. Which of the following figures is contained in the above pattern ?
(a) Fig. A (b) Fig. B (c) Fig. C
(d) Fig. D (e) Fig. E



6. Which of the following figures is contained in the above pattern ?
(a) Fig. A (b) Fig. B (c) Fig. C
(d) Fig. D (e) Fig. E



7. Which of the following figures is contained in the above pattern ?
(a) Fig. A (b) Fig. B (c) Fig. C
(d) Fig. D (e) Fig. E



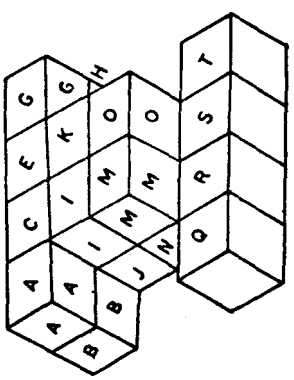
8. Which of the following figures is contained in the above pattern ?
(a) Fig. A (b) Fig. B (c) Fig. C
(d) Fig. D (e) Fig. E

UNIT TWENTY

Problems on Building Designs

BRIEF REVIEW OF CONCEPTS

The questions in the following chapter are based on the designs of buildings consisting of blocks or cubes. Each block has six sides. Candidates are required to find the number of blocks which have the maximum number of sides touching the other cube, or even to identify the cube which has the maximum or minimum number of sides touching the others.



1. The number of blocks which have maximum number of sides touching the other cubes is
(a) 1 (b) 2 (c) 3 (d) 4
(e) 5

Since each block has six sides, the number of sides exposed is more than the sides in contact with other blocks. Here, each of the blocks *C*, *E*, *I*, *K*, and *N* has two sides exposed. The number of sides touching other blocks is 6−2=4. Therefore, *C*, *E*, *I*, *K*, and *N* are touching the maximum number of blocks. Therefore, the answer is (e) 5.

2. The number of blocks touching the minimum number of blocks.
(a) 1 (b) 2 (c) 3 (d) 4
(e) 5

The answer is obviously (b) 2, because only *Q* and *T* touch just one block, five sides being exposed.

3. Which of the blocks *A*, *B*, *C*, *Q*, and *M* touch the maximum number of blocks?
(a) *A* (b) *B* (c) *C* (d) *Q*
(e) *M*

Obviously the answer is (c) *C* because it has only two sides exposed: the rest are touching other blocks. Hence *C* is touching the maximum number of blocks.

4. Which of the blocks *R*, *S*, *O*, *M*, and *I* touch the maximum number of blocks?
(a) *I* (b) *M* (c) *O* (d) *R*
(e) *S*

Here the answer is (a) *I* because of *I*, *M*, *O*, *R*, and *S*, only *I* has two sides exposed and the other four touching other blocks.

5. Which of the blocks *M*, *O*, *R*, *S*, and *E* touch the maximum number of blocks?
(a) *E* (b) *M* (c) *O* (d) *R*
(e) *S*

The answer is (a) *E* because two sides of *E* are exposed and the rest, 6−2=4 sides, are touching other blocks.

OBJECTIVE EVALUATION

Study the diagram in the example and answer the following questions.

1. Which of the blocks *G*, *M*, *O*, *R*, *Q* touch the minimum number of blocks?
(a) *G* (b) *M* (c) *O* (d) *Q*
(e) *R*

2. Which of the blocks *C*, *E*, *I*, *K*, and *M* touch the minimum number of blocks?
(a) *C* (b) *E* (c) *I* (d) *K*
(e) *M*

3. How many blocks are touching four blocks?
(a) 1 (b) 2 (c) 3 (d) 4
(e) 5

4. Which of the blocks is hidden under block *K*?
(a) *P* (b) *L* (c) *D* (d) *F*
(e) *H*

5. Which of the blcoks is hidden under *O*?
(a) *P* (b) *L* (c) *D* (d) *F*
(e) *S*

6. How many blocks are hidden underneath?
(a) 2 (b) 3 (c) 4 (d) 5
(e) 6

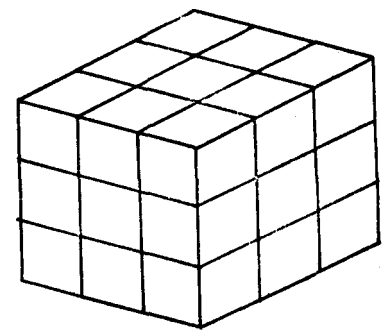
7. Which of the blocks is touching two blocks but only one side is visible?
(a) *Q* (b) *T* (c) *N* (d) *H*
(e) *E*

8. Number of blocks lying underneath *A*, *C*, *E*, *G* is
(a) 2 (b) 3 (c) 4 (d) 5
(e) 6

9. The number of blocks lying underneath *I*, *K*, *M*, *O* is
(a) 2 (b) 3 (c) 4 (d) 5
(e) 6

10. Total number of blocks in the diagram is
(a) 16 (b) 20 (c) 24
(d) 12 (e) 14

The figure represents a wooden block of 3 cm edge, with all its faces painted black. If the block is cut along the dotted lines, the



number of blocks obtained is 27, each of cm^3 volume.

11. How many of these have no painted faces?
(a) 1 (b) 3 (c) 4 (d) 5
(e) 7

12. How many of these have two painted sides?
(a) 4 (b) 5 (c) 6 (d) 7
(e) 8

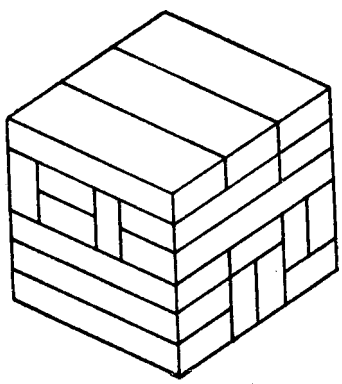
13. How many of these have one painted side?
(a) 4 (b) 5 (c) 6 (d) 7
(e) 8

14. How many of these have three painted sides?
(a) 4 (b) 6 (c) 8 (d) 10
(e) 12

15. The surface area of all the smaller cubes which are painted, with respect to their total surface area, is
(a) 1/3 (b) 1/9 (c) 1/12
(d) 1/24 (e) None of these

16. The surface area which remains unpainted, with respect to total surface area, is
(a) 3/4 (b) 1/3 (c) 2/3
(d) 3/2 (e) 1/6

The figure represents a 6 cm cube made up of pieces each 1 cm thick, 2 cm wide and 6 cm long. Each block is painted in three colours, red, blue and yellow, the top of each block being red, bottom blue and vertical sides yellow.



17. How many $1\times2\times6$ cm^3 blocks are there in the cube?
(a) 15 (b) 18 (c) 27
(d) 36 (e) 24

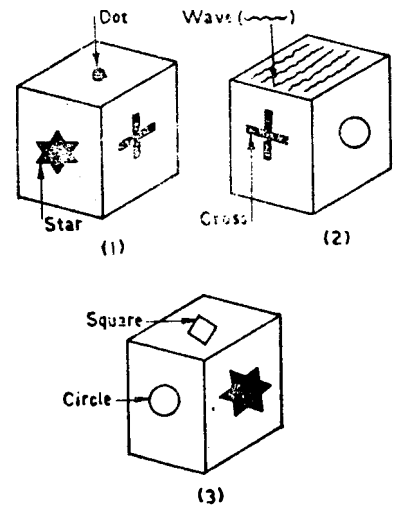
18. How many cm^2 of the block are painted blue?
(a) 150 (b) 316 (c) 210
(d) 256 (e) 180

19. What is the largest number of plane surfaces of other blocks touched by the plane surfaces of any one block?
(a) 8 (b) 11 (c) 13
(d) 15 (e) 16

20. How many cm^2 of blue surface are touching the red surface?
(a) 94 (b) 108 (c) 144
(d) 196 (e) 216

21. Which arrangement of the block, forming a 6 cm cube painted in the fashion described, would require the smallest possible area of yellow paint?
(a) All blocks laid with a 2×6 side horizontal.
(b) All blocks laid with a 1×6 side horizontal.
(c) All blocks laid with a 1×2 end horizontal.
(d) All blocks laid with a 1×2 side vertical.
(e) The arrangement makes no difference.

The following diagrams show three different views of a single cube. Different symbols are marked on each face. Symbols, as shown in the diagrams, are dot, star, cross, waves, circle and square.



22. Which symbol is opposite the dot?
(a) circle (b) cross (c) square
(d) waves (e) star

23. Which symbol is opposite the cross?
(a) cross (b) dot (c) square
(d) waves (e) star

24. Which symbol is on the bottom of Fig. 3?
(a) cross (b) dot (c) star
(d) waves (e) none of these

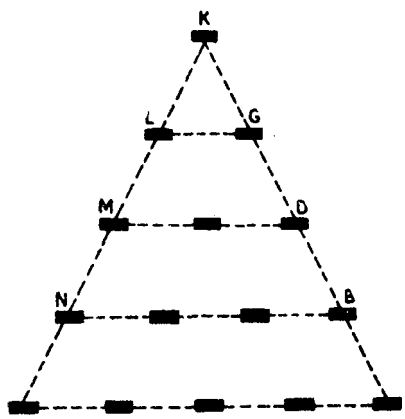
25. Which symbol is on the bottom of Fig. 2?
(a) star (b) cross (c) circle
(d) dot (e) none of these

UNIT TWENTY ONE

Point Location Test

BRIEF REVIEW OF CONCEPTS

The following chapter is based on the triangular system. This may be based on a rectangle or any other geometrical figure. Here, some letters or numbers are placed on chosen points. The points are chosen according to a particular pattern or system, as given in the following figure pattern.



Study the diagram and find out the order in which the alphabets are arranged.

The letter on the base line from the right is
(a) *A* (b) *C* (c) *F* (d) *J*
(e) none of the above

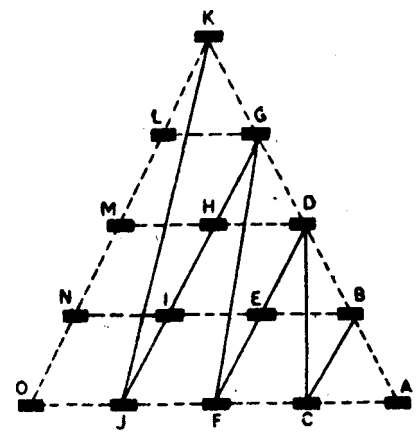
The letter on the base line from the right, i.e. the vertex on the right side of the base line, must be *A* because other points also conform to the same order. Therefore, the answer is (a) *A*.

In fact, all the blank points must be discovered and letters corresponding to some particular pattern must be assigned to these points.

● The second letter on the line between *N* and *B* from the right, is
(a) *C* (b) *E* (c) *F*
(d) *I* (e) *H*

The answer is (b) *E* as *E* conforms to the same pattern or order as *A*.

The alphabets in the above figure pattern are placed in the following order, which gives the solution to questions based on this figure.



● The third letter on the base line from the right is
(a) *A* (b) *C* (c) *F*
(d) *J* (e) *O*

The answer is obviously (c) *F* as it conforms to the same order as the other alphabets.

● The letter on the base line between *M* and *D* is

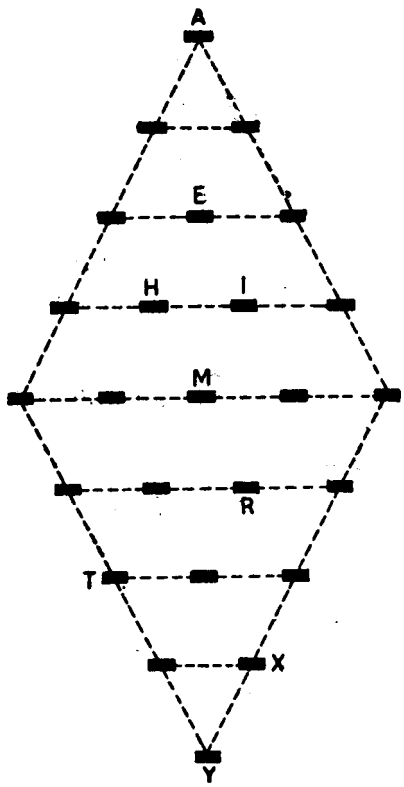
(a) *E* (b) *H* (c) *I*
(d) *J* (e) *F*

The answer is obviously (b) *H* as it satisfies the same condition.

● The fifth letter on the base line from the right is
(a) *A* (b) *C* (c) *F*
(d) *J* (e) *O*

The answer is obviously (e) *O* as it conforms to the order followed by the other alphabets.

OBJECTIVE EVALUATION



Study the above figure and answer the following question, from the choice given below.

1. The first letter on the base line of *M* from the right is
(a) *D* (b) *G* (c) *K*
(d) *O* (e) *N*
2. The letter on the extreme left of *R* on the same line is
(a) *G* (b) *P* (c) *K*
(d) *R* (e) *Q*
3. The letter to the left of *X* on the same base line is
(a) *T* (b) *U* (c) *V*
(d) *Z* (e) *W*
4. The letter just on the left of *M* on the same base line is
(a) *M* (b) *J* (c) *L*
(d) *S* (e) *P*
5. The letter on the extreme right of *T* on the same base line is
(a) *M* (b) *V* (c) *N*
(d) *Q* (e) *R*
6. The letter just on the right of *M* on the same base line is
(a) *J* (b) *L* (c) *K*
(d) *O* (e) *N*
7. The letter on the left-hand side on the first base line is
(a) *B* (b) *C* (c) *D*
(d) *F* (e) *G*
8. The letter on the extreme left of *M* on the same base line is
(a) *J* (b) *O* (c) *K*
(d) *P* (e) *L*
9. The letter on the left of *E* on the same base line is
(a) *B* (b) *D* (c) *C*
(d) *F* (e) *G*
10. The letter on the extreme right of *I* on the same base line is
(a) *L* (b) *N* (c) *O*
(d) *Q* (e) *J*
11. The number of vowels used is
(a) 5 (b) 4 (c) 3
(d) 2 (e) 1
12. The number of consonants used is
(a) 21 (b) 22 (c) 23
(d) 20 (e) 19

Answers

Unit one: Number Series

1. (b)
2. (c)
3. (c)
4. (a)
5. (d)
6. (c)
7. (a)
8. (a)
9. (c)
10. (c)
11. (b)
12. (b)
13. (e)
14. (c)
15. (d)
16. (c)
17. (c)
18. (b)
19. (d)
20. (c)
21. (a)
22. (c)
23. (b)
24. (e)
25. (b)
26. (d)
27. (a)
28. (c)
29. (c)
30. (d)
31. (b)
32. (d)
33. (a)
34. (c)
35. (d)
36. (b)
37. (a)
38. (d)
39. (d)
40. (b)
41. (40)
42. (4)
43. (8)
44. (192)
45. (27)
46. (60)
47. (11)
48. (729)
49. (6)
50. (256)

Unit two: Letter Series

1. (e)
2. (e)
3. (e)
4. (b)
5. (a)
6. (c)
7. (e)
8. (b)
9. (a)
10. (a)
11. (d)
12. (c)
13. (b)
14. (d)
15. (a)
16. (d)
17. (a)
18. (c)
19. (b)
20. (b)
21. (a)
22. (d)
23. (a)
24. (d)
25 (c)
26. (c)
27. (a)
28. (a)
29. (d)
30. (b)

Unit Three: Sequence of Letters

1. (b)
2. (c)
3. (c)
4. (c)
5. (d)
6. (d)
7. (e)
8. (c)
9. (d)
10. (b)
11. (d)
12. (c)
13. (e)
14. (d)
15. (a)
16. (a)
17. (b)
18. (a)
19. (c)
20. (d)

Unit Four: Problems on Jumbled Letters

1. (a)
2. (e)
3. (e)
4. (e)
5. (d)
6. (e)
7. (c)
8. (e)
9. (a)
10 (b)
11. (a)
12. (d)
13. (e)
14. (c)
15. (e)
16. (e)
17. (e)
18. (e)
19. (e)
20. (e)
21. (e)
22. (a)
23. (b)
24. (b)
25. (c)

Unit Five: Mathematical Aptitude I

1. (d)
2. (e)
3. (c)
4. (e)
5. (c)
6. (c)
7. (d)
8. (c)
9. (c)
10. (d)
11. (b)
12. (d)
13. (d)
14. (b)
15. (d)
16. (b)
17. (d)
18. (c)
19. (c)
20. (b)

Unit Six: Mathematical Aptitude II

1. (e)
2. (c)
3. (e)
4. (d)

5. (b)
6. (d)
7. (e)
8. (e)
9. (b)
10. (e)
11. (a)
12. (b)
13. (e)
14. (d)
15. (c)
16. (e)
17. (c)
18. (e)
19. (e)
20. (b)
21. (c)
22. (c) & (a)
23. (d)
24. (a) & (c)
25. (a)
26. (a)
27. (d)
28. (a)
29. (b)
30. (c)

Unit Seven: Numbers Round the Circle

1. (e)
2. (c)
3. (b)
4. (b
5. (b)
6. (c)
7. (b)
8. (c)
9. (c)
10. (d)
11. (c)
12. (c)
13. (a)
14. (b)
15. (d)
16. (d)
17. (c)
18. (c)
19. (b)
20. (c)
21. (b)
22. (d)
23. (e)

Unit Eight: Numbers in Squares or Cells

1. (e)
2. (a)
3. (e)
4. (e)
5. (a)
6. (a)
7. (e)
8. (b)
9. (b)
10. (d)
11. (b)
12. (c)
13. (a)
14. (c)
15. (c)

Unit Nine: Coding-Decoding I

1. (b)
2. (d)
3. (e)
4. (d)
5. (a)
6. (d)
7. (c)
8. (c)
9. (d)
10. (d)
11. (c)
12. (b)
13. (e)
14. (b)
15. (d)
16. (d)
17. (e)
18. (b)
19. (c)
20. (c)
21. (d)
22. (d)
23. (c)
24. (d)
25. (a)
26. (a)
27. (e)
28. (c)
29. (b)
30. (e)

Unit Ten: Coding-Decoding II

1. (d)
2. (d)
3. (e)
4. (b)
5. (b)
6. (a)
7. (b)
8. (a)
9. (b)
10. (e)
11. (a)
12. (b)
13. (c)
14. (a)
15. (d)
16. (d)
17. (b)
18. (c)
19. (c)
20. (d)
21. (b)
22. (d)
23. (b)
4. (d)
25. (c)
26. (a)
27. (c)
28. (b)
29. (d)
30. (a)
31. (e)
32. (d)
33. (d)
34. (c)
35. (a)
36. (c)
37. (b)

Unit Eleven: Letter Number Series

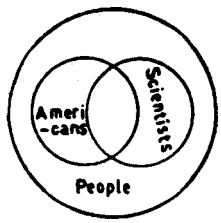
1. (d)
2. (b)
3. (e)
4. (d)
5. (d)
6. (a)
7. (a)
8. (c)
9. (a)
10. (b)
11. (d)
12. (d)
13. (c)
14. (c)
15. (a)
16. (b)
17. (b)
18. (b)
19. (d)
20. (d)
21. (b)
22. (a)
23. (c)
24. (c)
25. (c)

Unit Twelve: Problems on Venn Diagrams

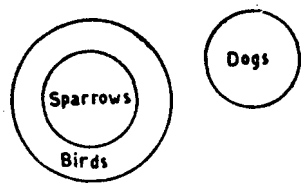
1. (d)
2. (c)
3. (d)
4. (b)
5. (e)
6. (e)
7. (c)
8. (e)
9. (d)
10. (c)
11. (a)
12. (b)
13. (a)
14. (d)
15. (c)
16. (a) & (c)
17. (b)
18. (b)
19. (b)
20. (a)
21. (c)
22. (a)
23. (c)
24. (b)
25. (b) & (d)

Unit Thirteen: Logical Diagrams

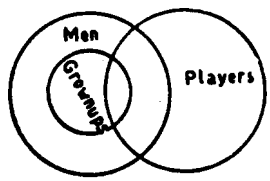
1. (4) Some Americans are scientists and some scientists are Americans. All scientists and Americans are people.



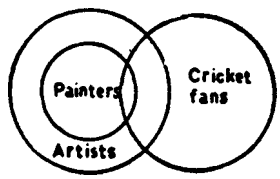
2. (3) All sparrows are birds but dogs are quite different, i.e. no dogs are sparrows or birds. No sparrows or birds are dogs.



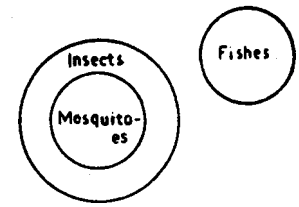
3. (5) All grown ups are men; some grown ups and men are players.



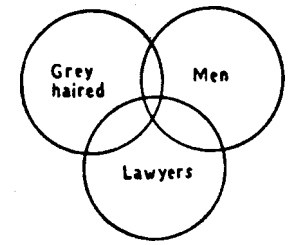
4. (5) All painters are artists, some painters and artists are cricket fans.



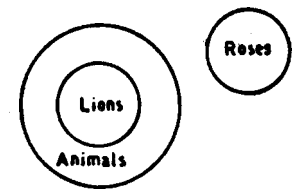
5. (3) All mosquitoes are insects; fishes are neither mosquitoes nor insects.



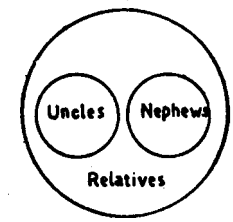
6. (2) Some men are grey haired and some are lawyers; some lawyers are grey haired and some are men, some lawyers are men and grey haired as well.



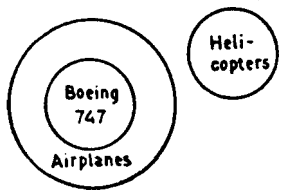
7. (3) All lions are animals. No lion is a rose and no rose is a lion or animal.



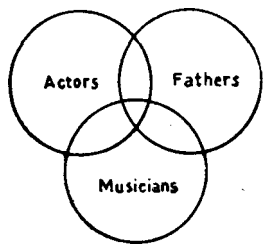
8. (5) No uncle is a nephew and no nephew is an uncle but all uncles and nephews are relatives.



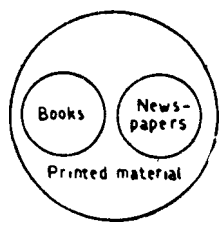
9. (5) All Boeing 747's are airplanes, but no Boeing 747's or airplanes are helicopters.



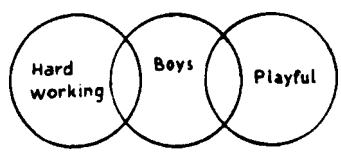
10. (2) Some musicians are actors and some actors are musicians. However, both musicians and actors can be fathers.



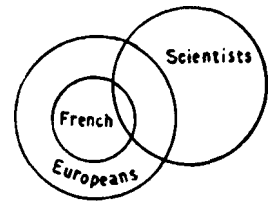
11. (5) No books are newspapers and no newspapers are books but both books and newspapers are printed.



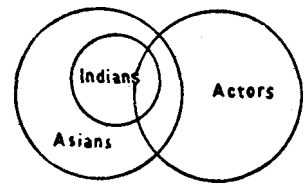
12. (3) Some boys are hard working and some are playful, but no playful boy is hard working and no hard working boy is playful.



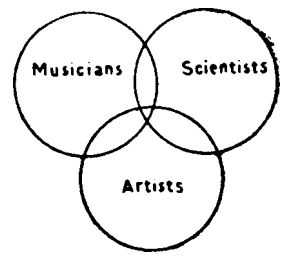
13. (4) All French are Europeans, some scientists are Europeans and some of these are French.



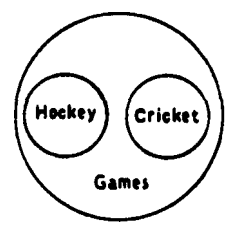
14. (4) All Indians are Asians; some actors are Asians as well as Indians.



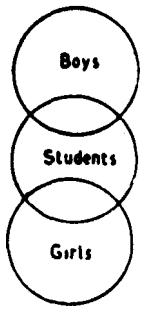
15. (2) Some musicians are artists and some artists are musicians; some scientists may be artists as well as musicians.



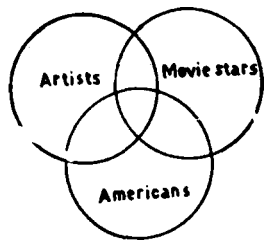
16. (5) No hockey is cricket and no cricket is hockey, but both hockey and cricket are games.



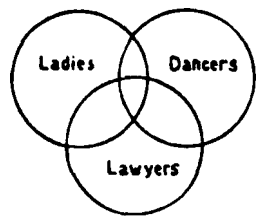
17. (3) Some students may be boys and some girls may be students. No boys can be girls and no girls can be boys.



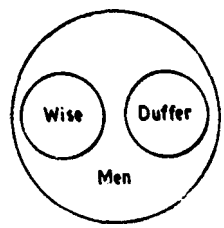
18. (1) Some artists may be Americans and some Americans may be movie stars. Some artists may be movie stars and Americans as well.



19. (2) Some ladies may be dancers and some ladies may be lawers, and some may be both.



20. (5) Some men may be wise and some duffers but no duffer can be wise. Both are men.



Unit Fourteen: Graphic Interpretations

1. (b)
2. (d)
3. (e)
4. (d)
5. (a)
6. (a)
7. (e)
8. (b)
9. (d)
10. (e)
11. (d)
12. (b)
13. (d)
14. (e)
15. (d)
16. (d)
17. (b)
18. (e)
19. (a)
20. (e)
21. (c)
22. (d)
23. (c)
24. (a)
25. (d)

Unit Fifteen: Analogy Test

1. (b)
2. (c)
3. (c)
4. (b)
5. (b)
6. (a)
7. (a)
8. (c)
9. (c)
10. (e)
11. (c)
12. (c)
13. (c)

Unit Sixteen: Sets of Numbers

1. (c)
2. (c)
3. (d)
4. (d)
5. (b)
6. (a)
7. (b)
8. (a)
9. (e)
10. (e)
11. (c)
12. (e)
13. (b)
14. (a)
15. (d)
16. (a)
17. (c)
18. (d)
19. (e)
20. (b)

Unit Seventeen: Spatial Ability

1. (b)
2. (e)
3. (b)
4. (a)
5. (b)
6. (e)
7. (c)
8. (a)
9. (b)
10. (c)
11. (c)
12. (e)

Unit Eighteen: Geometrical Diagrams

1. (c)
2. (c)
3. (b)
4. (c)
5. (b)
6. (c)
7. (d)
8. (b)
9. (c)
10. (d)
11. (d)
12. (d)
13. (b)

Unit Nineteen: Identification of Geometrical Patterns

1. (e)
2. (e)
3. (d)
4. (b)
5. (b)
6. (e)
7. (c)
8. (b)
15. (a)
16. (c)
17. (b)
18. (e)
19. (b)
20. (c)
21. (a)
22. (a)
23. (c)
24. (a)
25. (a)

Unit Twenty: Problems on Building Designs

1. (d)
2. (e)
3. (e)
4. (b)
5. (a)
6. (c)
7. (d)
8. (c)
9. (c)
10. (b)
11. (a)
12. (e)
13. (c)
14. (c)

Unit Twenty-one: Point Location Test

1. (d)
2. (b)
3. (e)
4. (c)
5. (b)
6. (e)
7. (a)
8. (c)
9. (b)
10. (e)
11. (a)
12. (d)

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